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ABSTRACT

A set of three studies focused primarily on an indepth analysis of the National Longitudinal Survey ("Parnes") data tapes, concentrating particularly on the experience of young men and young women, but collating them also with data on experience and background of other family members available in the parallel surveys. Research was conducted in three major areas (presented in the three separate papers included): (1) The effects of schooling interruption and work while in school on subsequent educational and economic success of individuals (The ability-schooling-income relations were analyzed using data on families); (2) re-examination of estimates of returns to schooling and the effect of controlling for ability on them; and (3) the changing economic market for college graduates and its impact on the individual returns to education and the educational system as a whole, and its effect on traditional black/white differences in socioeconomic attainment. Some major implications of the research follow: (1) College training may no longer be as valuable an investment in human capital as in years past, suggesting more emphasis on other forms of vocational training, (2) the role of learning by experience or on-the-job training suggests the need for substantial work on the "actual" way in which human capital accumulation occurs and the possible tools for influencing it, and (3) given the current state of knowledge and data on the economic success of individuals, neither family background nor measured ability account for a major portion of the observed variance in the economic success of individuals. (TA)

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Econometric Investigations of Determinants and Returns to Schooling, Training, and Experience

Final Report to the National Institute of Education

Principle Investigators: Zvi Griliches, Professor
Richard Freeman, Associate Professor

Harvard University
Cambridge, Massachusetts 02138

CE 011 244

Final Report to the
National Institute of Education

I. Administrative Data

Grant No. NIE-G-00-3-0202

Title: Econometric Investigations of Determinants and Returns to Schooling, Training, and Experience

Principle Investigators: Zvi Griliches, Professor
Richard Freeman, Assoc. Professor

Institution: Harvard University
Cambridge, Massachusetts 02138

Amount: $165,000

Duration: September 1973 - March 31, 1977

II. Aims

The set of studies supported by this grant focused primarily on the newly collected data from the National Longitudinal Surveys with the aim of estimating the monetary returns to different types of training and experience, examining the interaction of individual ability and family background on schooling and income, and investigating the effects of interruptions and work while-in-school on subsequent educational and socio-economic success of individuals. Particular attention was to be given to the impact of recently changing market conditions for highly educated new young entrants into the labor market and to the effect of background on black achievement. Newly developed econometric estimation methods for models with unobserved components of variance were to be used, and elaborated further, paying special attention to errors of measurement in the main variables of interest. It was hoped that the results of this research would allow us to evaluate better current proposals for reforming the institutions serving our youth.

III. Conduct of Research

(a) The data: The bulk of our research involved an in-depth analysis of the National Longitudinal Survey ("Parnes") data tapes. When complete these data will provide 6 to 8 years of data on national samples of four cohorts (about 5,000 individuals each):

young men (14-24 aging to 21-31); young women (14-24 through 21-31); women (30-44 through 37-51); and, older men (45-59 through 52-66). These data, while far from perfect, contain detailed information on parental background, schooling, training, labor force participation, earnings, income and assets. In addition, for the young men and women cohorts data was also collected on their school performance, IQ tests administered in the school setting, and background information on the schools themselves. Thus, many more detailed studies of the relationship of earnings to schooling, training, race, ability and parental background can be undertaken with these data.

Of special interest to us is the fact that while each of these panels (cohorts) is an independent sample from the respective population stratum (with an over representation of blacks), to save on sampling costs the Census Bureau based all of these samples on one larger sample of households. Thus, there is an overlap of fathers and sons, brothers and sisters, and mothers and daughters in the various panels. We have been able to obtain the original sample listings and have matched family members across panels, yielding a sample of about 900 fathers and sons and more than a thousand brothers, thus far.

We have worked primarily with the young men surveys, covering 1966 to 1970 and have used the young women surveys in an effort to control for errors in measurement in the other surveys. The main drawback of these data is the relatively young age of the respondents in the young men and women samples. In the 1969 survey of young men, for example, the average age of out-of-school respondents with reasonably complete data on them was only 21 years. We do expect, however, to continue following these cohorts as they age. We are currently in the process of incorporating the data for the 1971 and 1973 Young Men Surveys into our system and we will be rechecking our earlier results against them.

In order to get more up-to-date information on changes in the value of education and on the characteristics of persons going to college, we have also made use of the Current Population Reports Survey data tapes. In particular, we have compared the situation of young and older persons in 1974 to their situation

in 1969, the last "good" year in the market for college graduates. The Current Population Survey data lack useable longitudinal information but cover a large population, of approximately 200,000 persons (50,000 families) and can be "up-dated" and reanalyzed every few years, allowing us to follow the recent large cohorts of young people as they enter the job market.

(b) Organization of Research: The research has been conducted by three sets of investigators. Professor Griliches has taken the primary responsibility for analyzing the ability-schooling-income relations using data on families and, in conjunction with Professor Gary Chamberlain, has developed new statistical techniques for analyzing data on related individuals and repeated observations on the same individuals.* Professor Freeman has focused on returns to different types of training and on the effect of the changing market on traditional black/white differences in socio-economic attainment. A number of students have analyzed several additional topics in this area: William Epstein looked at the returns to, and the costs of, work experience during school years; Stephen Messner compared the quality of son's reports on father's education and occupation with their father's self-reports on the same variables; and, William Marmol investigated the implied reliability of different IQ measures. In addition, Ph.D. dissertations were completed by Howard Birnbaum, Charles Brown, William Epstein, and Edward Lazear.

Finally, a major programming effort was made in cleaning and merging the NLS tapes and in a variety of analytical runs. We have completed the development of a "brothers" tape and a "brothers and sisters" tape based on a merger of the data from several NLS Surveys.

*The work of Professor Griliches and of Gary Chamberlain has also been supported by NSF Grant No. G.S. 39865.

(c) Methodology: Each of the researchers has developed or used methodology relevant to his own problems. Freeman's work, for example, has relied extensively on multivariate statistical analysis, supplemented with logit and newly developed multiple contingency table statistical techniques. Griliches has concentrated on the methodological problems raised by the availability of repeated observations on particular individuals. Having both time-series and cross-section observations on individuals allows for the expansion of usual regression analysis framework into a much broader consideration of errors-in-variables and the effect of unobservable components of behavior. Griliches, in conjunction with Chamberlain, has made substantial use of new unobserved variance components models, developed as part of this project, to deal with these issues and to reexamine earlier studies of schooling and earnings.

IV. Results and Findings

There were three major areas of research under this grant: 1. The effects of schooling interruption and work while in school on subsequent educational and economic success of individuals. 2. A re-examination of estimates of returns to schooling and the effect of controlling for ability on them. 3. The changing economic market for college graduates and its impact on the individual returns to education and the educational system as a whole. Our extensive work in these areas is surveyed in three brief summary papers: "Schooling Interruption, Work While in School, and The Returns from Schooling" by Zvi Griliches, "Estimating the Returns from Schooling: A Progress Report" by Zvi Griliches and "The Depressed College Job Market: Issues and Implications" by Richard B. Freeman. These papers are attached as appendices to this report. A list of all other publications and unpublished reports is given in section VI. A complete set has been supplied to the Institute. We shall, therefore, only summarize briefly here some of our more interesting findings and results.

(1) Our attempt to analyze the effect of interrupting schooling on subsequent economic success was one of our least successful efforts. The NLS data could not really shed much light on this issue. First (out of a total of 2136) there were only 185 young men with a schooling interruption as of 1969 and wages as of 1970. Second, these 185 young men were a highly self-selected group: they had decided to stop being drop-outs, to interrupt their interruption, and return to school. By and large they were right. There was no evidence in the data that the interruption was costly to them (beyond the loss of continuous work experience). But since those for whom it may have been costly would have had less incentive to return to school, it is hard to generalize on the basis of these results. The sample is just too unrepresentative. See [35]*.

(2) Our sample of those who worked while in school is much larger and much more representative of the population as a whole. Work while in high-school had no significant (positive or negative) effect on wages as of 1970. Work while in college had a mild positive effect on subsequent wages, on the order of one half of what the contribution of regular work experience would have been. It appears that work, engaged in in moderation, does not impinge seriously on scholarship or on subsequent economic success. [35].

(3) An analysis of alternative modes of training, using the NLS Older Men panel, highlights the surprisingly wide prevalence of formal non-academic occupational training of considerable length, with about half of the 45-59 year older men having made such investments with a mean length of one and a half years of such training. Formal occupational training in proprietary schools is a significant alternative to academic schooling, raising earnings per year of training as much as formal education does per

*The numbers in brackets refer to publications listed in Section VI of this report.

year of schooling. This type of training is distinguished by the attempt to reduce foregone worktime. Because of lower time costs, the total cost of proprietary training is similar to that of colleges and universities despite higher tuition. Because of lower subsidization, the social rate of return to such training appears to exceed that of higher education. Older black men, who faced greater discrimination in public education in years past, appear to have obtained relatively greater economic benefits from various formal occupational program than did whites. [16]

Investigation of black/white economic differences have yielded several important results.

(4) First, contrary to the widely held view that being brought up in a broken home is a major cause of black socio-economic failure and black/white differences, the broken home appears to have only a modest negative effect on the achievement of young black (and white) men, largely by reducing educational attainment, and accounts for less that 15% of black/white differences there. The bulk of the effect seems to be the result of low family income and less human capital and home educational resources in broken than complete homes. Absence of a major impact on the market achievement of children does not, however, mean that black family composition should not be a matter of concern, for the broken home may extract a large psychic cost from children [15].

(5) Second, the decade of the sixties appears to have witnessed a significant change in traditional social mobility patterns in black America. In past decades, as Blau and Duncan have shown, parental background measured by occupation or education of the head of household, had a much smaller effect on black than on white achievement. Despite the low social origins of most black Americans, only a moderate fraction of black/white differences was attributable to the background burden. Analysis of the NLS young men shows, by contrast, strikingly different background and achievement relations among blacks in the 1960s.

The impact of family background on educational, occupational and income achievement increased for blacks, approaching the impact on whites while previously critical geographic factors declined in importance; black youngsters from better family backgrounds made greater gains in the market than those from poorer backgrounds, creating greater class differences within black America. The importance of background differences in the black/white economic gap has increased to the extent that most, though not all, of the differences among the young men could be attributed to background differences -- which is in contrast to the previous relative unimportance of these variables. [15]

(6) Black Americans made continued economic progress relative to whites in the 1970s, despite the weakened state of the labor market. Their rate of secular progress was basically maintained even into early 1975, although the cyclic downturn had the usual deleterious effect on the relative employment of blacks. Especially large gains were made in the early seventies in managerial jobs by educated blacks, with the consequence that increasing numbers of black students prepared for business careers in college [17,20,21].

(7) Economic rewards for blacks with graduate training came to exceed those for whites, although some income disparities remained at the top of the education ladder. The high return to graduate training, together with new opportunities in higher education, significantly increased the number of black young men and women going on in their studies. Even so, the gap in black and white graduate attainment appears likely to persist for many decades due to the "heavy hand" of past discrimination [20,21].

(8) Analysis of the growth of income of young high school graduates in the 1966-69 period by Charles Brown shows that the standard human capital model of on-the-job training does not do a good job in accounting for the experience of recent labor market entrants: individual earnings and wages increase at a decreasing rate that exceeds the rate of decrease expected on the basis of the model. This appears to result from simplifications used to analyze optimal human capital investment over time: the assumption that increased

human capital leaves the cost of investing in it unaffected; the lumping of different types of investment into a single homogeneous stock; and, the disregard of investments made in the search for a better price for a given stock of human capital. When high school graduates are stratified by family background and IQ, those with higher IQ scores appear to have somewhat greater increases in income as they age while those from better socio-economic family backgrounds do not. It appears, on the basis of these results, that the optimal investment in human capital model, while a fruitful intellectual exercise, does not successfully explain the wage gains of young men [3,4].

(9) Birnbaum's analysis of the effect of first job on future occupational status confirmed that even with education and family background fixed, first job affects status many years later. However, the "first job effect" appears to be primarily operative at top level jobs, with the older men from lower level first jobs experiencing substantial mobility over their working life. Interpretations of the "first job" effect turns out to be complex. On the one hand, the data can be viewed as consistent with an unobserved human capital model in which those getting better first jobs (all else the same) are really more able. On the other, a dual labor market structure model is also broadly consistent with patterns of first job effects, though the finding that most of the effect operates at the top of the job hierarchy casts some doubt on usual "dual" labor market structure models which focus on alleged lack of mobility from service to industrial plant/craft occupations [1,2].

(10) Edward Lazear's analysis of the effect of cyclical developments on on-the-job training, as inferred from rates of growth of wages of the NLS Young Men, has yielded one striking finding. From a wide variety of data, it appears that on-the-job training or learning from experience is greater in recessions than in booms for those who remain at work. As a result, persons with jobs during periods of economic decline obtain especially large increases in income in the furture. The theoretical reason for this appears to be the reduced "cost" of providing training during

the recession due to the relative fall in the price of current output as opposed to training. A similar countercyclical pattern has, it should be noted, been found for enrollments in formal education [38,39].

(11) Our studies of the changing college job market have yielded several important results regarding the extent, causes, and nature of the decline, which are described in detail in "The Depressed College Job Market: Issues and Implications" [28]. The major findings can be summarized briefly:

(a) The labor market for the highly educated underwent an unprecedented downturn in the 1970s, substantially reducing the economic rewards from college and graduate training, especially for young persons and new labor market entrants.

(b) The decline in income and employment opportunities had differential effects on various groups, with the rate of return to the college investments of black youngsters less adversely affected than those of whites, and new opportunities for women in primarily male college occupations partially offsetting the effects of the decline in the teachers market on their career prospects.

(c) The decline occurred differentially among fields, being most severe in liberal arts, academic, and research-oriented occupations at the doctorate level, and least severe in business-oriented professions, such as accounting, engineering and management.

(d) The historic upward trend in the proportion of young persons enrolling in college came to an end, with the propensity to go to college actually falling among young white males. Because of differential market patterns, however, blacks continued to enroll in large numbers in college while the proportion of young women in college roughly stabilized. In addition, there were significant changes in fields of study, apparently in response to changing market opportunities.

(e) The relative surplus of college workers reduced the white collar employment opportunities for less educated workers,

making it more difficult for young high school workers to obtain jobs as salesmen, clericals, managers, and professionals.

(e) The depressed state of the college job market appears likely, on the basis of forecasts from a small econometric model, to continue until the end of the seventies, when the decreased number of new graduates induced by the decline will cause a modest upturn -- but not the recurrence of the boom conditions of the 1960s, at least not in the next two decades.

(12) In a series of studies we have reexamined the bias in the estimated returns to schooling from ignoring differences in individual ability. These studies are summarized in [36]. The major findings were:

(a) There is a consistent bias in the estimated schooling coefficient if one ignores ability, but it is relatively small, about 10 to 15 percent of the estimated schooling coefficient, or about one percentage point in the estimated private rate of return to schooling of about six percent.

(b) There is some evidence that the actual rate of return to schooling may be underestimated, due to ignoring other sources of bias such as errors in the measurement of schooling, differential availability of fringe benefits, and self-selection among our sample of younger men.

(c) Detailed examination of data on brothers indicates that if we identify "ability" with the thing that is measured (albeit imperfectly) by test scores and if we accept the genetic hypothesis that this variable has a family component, then the unobservable variable that fits these requirements appears to have little to do with earnings beyond its indirect effect via schooling. "Ability" may be important also in the determination of income given schooling, but that kind of ability is not measured well by IQ type test scores.

(d) While schooling does not account for a great deal of the observed variance in wages and earnings, additional schooling could and was used in the 1960s to overcome social class handicaps and to compensate for and eliminate some of the systematic sources of observed income inequality. The results of our data analyses

can be summarized by asking what it implies for two youngsters who are one standard deviation apart on each of a list of family background variables and IQ. The model estimated in [31] predicts that they would find themselves, other things equal, about .75 and .40 of a standard deviation apart on schooling and wages, respectively, indicating a rather strong regression towards the mean. But if the youngster with the lower family background and IQ managed somehow to acquire an extra 4 years of schooling (e.g., went on to and completed college), which would be equal to an additional 1.5 standard deviation units of schooling, it would essentially wipe out his original handicap. If, in fact, he had had an equal IQ to start with, he would need only about 2 more years of schooling to compensate for his lower social class start.

(13) Significant advances were also made in the statistical methodology of such studies. In particular we developed maximum likelihood estimation methods for models with unobservable variables with a variance-components structure [11], extended them to the case of several unobservable variables [12], described the rules for determining whether such models are identifiable [7,9], developed new computer programs for this class of problems and adopted and extended existing [LISREL] programs for our purposes. Some of the methodological innovations have been surveyed in [30] and [34].

V. Implications

There are several implications for research and policy which are emerging from this project, some to be pursued in future work and others which could be pursued by others. First, and with the most direct policy implications, is the evidence that college training may no longer be as valuable an investment in human capital as in years past, suggesting more emphasis on other forms of vocational training. Because of the magnitude and significance of societal investment in human capital, this should be both checked and pursued in great detail before it is acted on. Second, the important role of learning by experience or on-the-job training, indicated by its persistent effect and by comprehensible

differences in effects among groups, suggests the need for substantial work on the "actual" way in which human capital accumulation occurs and the possible tools for influencing it. Third, the striking advances made by black Americans in recent years and the changes in traditional patterns of mobility indicate the possible efficacy of public (and private) policies to change long standing socio-economic discrimination. It is important to learn more about the mechanism which accomplished these changes. Fourth, given the current state of knowledge and data on the economic success of individuals, neither family background nor measured ability account for a major portion of the observed variance in the economic success of individuals. Thus, there is no point in embracing various "predestination" theories. There may be quite a bit of room left for social policy and clearly much yet to be done in terms of additional research.

VI. Publications and Dissemination

Most of the work under this grant has been disseminated through publication of articles and books in the scientific literature. In addition, unpublished mimeographed papers have been distributed through the facilities of the Harvard Institute for Economic Research as part of its Discussion Papers series. Also, Professors Chamberlain, Freeman, and Griliches participated in a number of scientific conferences and delivered many progress reports on their work. A list of all the completed work supported wholly or partially by this project follows.

Papers Published or Completed: September 1973 - March 1977

Work supported wholly or in part by NIE Grant No. NE-G-00-3-0202

1. Birnbaum, Howard, M. "Determinents of Earnings: The Economic Significance of Job Experience and the Effect of Cohorts on Age-Earning Profiles," unpublished Ph.D. dissertation, Harvard University, Cambridge, Massachusetts 1974.

2. _____. "Career Origins, On-the-Job Training and Earnings." Southern Economic Journal, 42(4), April 1976, 587-599.

3. Brown, Charles. "Young Men: Human Capital and Earnings," unpublished Ph.D. thesis, Harvard University, Cambridge, Mass., 1974.

4. _____. "A Model of Optimal Human-Capital Accumulation and the Wages of Young High School Graduates." Journal of Political Economy, 84(2), 1976, 299-316.

5. Chamberlain, Gary. "Unobservable Variables in Econometric Models," unpublished Ph.D. thesis, Harvard University, Cambridge, Mass., January 1975.

6. _____. "Education, Income and Ability Revisited," Journal of Econometrics, 5, 1977. Reprinted in D. Aigner and A. Goldberger (eds.), Latent Variables in Socio-economic Models, North-Holland Publishing Co., The Netherlands, 1977, 143-161.

7. _____. "An Instrumental Variable Interpretation of Identification in Variance-Components and Mimic Models," Harvard Institute of Economic Research Discussion Paper, No. 538, March 1977. To appear in P. Taubman (ed.) Kinometrics.

8. _____. "Are Brothers As Good As Twins?", Harvard Institute of Economic Research Discussion Paper No. 533, January 1977. To appear in P. Taubman (ed.) Kinometrics.

9. _____. "Identification in Variance Components Models," Harvard Institute of Economic Research Discussion Paper No. 486, June 1976. Forthcoming in Econometrica.

10. _____. "Unobservables in Earnings Functions: Applications to the Malmo Data," Harvard University, 1976, unpublished.

11. Chamberlain, Gary and Zvi Griliches. "Unobservables with a Variance-Components Structure: Ability, Schooling and the Economic Success of Brothers," International Economic Review, 16(2), June 1975. Reprinted in Latent Variables in Socio-economic Models, D.H. Aigner and A.S. Goldberger (eds.), North-Holland Publishing Co., The Netherlands, 1977, 253-283.

12. _____. "More on Brothers," Harvard Institute of Economic Research Discussion Paper No. 469, September 1976. To appear in P. Taubman (ed.) Kinometrics.

13. Epstein, William. "Schooling and Occupation Decisions," unpublished Ph.D. dissertation, Harvard University, Cambridge, Mass., 1977.

14. Freeman, Richard B. "Overinvestment in College Training?" Journal of Human Resources, June 1975

15. _____. "Parental Family Structure and Socio-Economic Success: Effects of the Broken Family," Harvard Institute of Economic Research Discussion Paper No. 356, April, 1974.

16. _____. "Occupational Training in For-Profit and Technical Institutes," Review of Economics and Statistics, August, 1974.

17. _____. "Black Economic Progress After 1964: Who Has Gained?" Unpublished paper, Harvard University. Delivered at a Conference at Stanford, California, 1977.

18. _____. The Declining Value of Higher Education and the American Social System, Aspen Institute for Humanistic Studies, occasional paper, 1976.

19. _____. "Economic Rewards and Graduate Training in the New Market for Highly Educated Black Americans," (University of Illinois, Conference on Graduate Education, July 10-12, 1974).

20. _____. "Changes in the Job Market Discrimination and Black Economic Well-Being," (Notre Dame Civil Rights Conference, April 19, 1975).

21. _____. Black Elite: The New Market for Highly Qualified Black Americans, McGraw Hill, 1977, in press.

22. _____. The Overeducated American, New York, Academic Press, 1976, 200 pages.

23. _____. "Manpower Requirements and Substitution Analysis of Labor Skills: A Synthesis," Harvard Institute of Economic Research Discussion Paper No. 512, October 1976.

24. _____. "Youth Employment Opportunities: Changes in the Relative Position of College and High School Graduates," (Temple University Conference on Labor Market Information, October 21, 1974). In: Labor Market Information for Youths, S. Wolfbein (ed.), Temple University Press, 1975.

25. _____. "Decline in the Economic Rewards of College," Review of Economics and Statistics, Feb. 1977, in press.

26. _____. "Investment in Human Capital and Knowledge" in E. Shapiro and W.F. White (eds.) Capital for Productivity and Jobs, Prentice Hall, Inc. Englewood Cliffs, New Jersey, 1977, 96-123.

27. _____. "The Declining Economic Value of College Going," with H. Holloman, Change, September 1975. Reprinted in The Education Digest, December 1975.

28. _____. "The Depressed College Job Market: Issues and Implications," Harvard University, December 1976, unpublished.

29. _____. "The Role of Supply and Demand Forces in the Changing Market for College Graduates," Harvard University, August, 1976, delivered at the American Sociological Association Meetings, August 30, 1976.

30. Griliches, Zvi. "Errors in Variables and Other Observables," Econometrica, 42(6), November 1974. Also in Latent Variables in Socio-economic Models, D.J. Aigner and A.S. Goldberger (eds.), North-Holland Publishing Co., The Netherlands, 1977, 1-33.

31. _____. "Wages of Very Young Men," Journal of Political Economy, 1976, 84(4) part 2, S69-S85.

32. _____. "The Changing Economics of Education," in Resource Allocation and Economic Policy, M. Allington and M.L. Burstein (eds.), MacMillan Press Ltd., London, 1976, 35-43.

33. _____. "Earnings of Very Young Men," Harvard Institute of Economic Research Discussion Paper No. 535, January 1977. To appear in Griliches, Krelle, Krupp, and Kyn (eds.) Income Distribution and Economic Inequality, Campus Verlag, Frankfurt.

34. _____. "Estimating the Returns to Schooling: Some Econometric Problems," Econometrica, Vol. 45, No. 1, January 1977, 1-22.

35. _____. "Schooling Interruption, Work While in School, and the Returns from Schooling," Harvard Institute of Economic Research Discussion Paper No. 529, January, 1977.

36. _____. "Estimating the Returns to Schooling: A Progress Report," Harvard University, December 1976, unpublished.

37. _____. "Notes on Indexed Dependent Variables," Harvard University, May 1976, unpublished.

38. Lazear, Edward P. "The Timing of Technical Change: An Analysis of Cyclical Variations in Technology Production." Ph.D. thesis, Harvard University, Cambridge, Mass., August, 1974.

39. _____. "Age, Experience and Wage Growth," American Economic Review, September, 1976, Vol. 66, No. 4, 548-558.

VII. Finished and Unfinished Business

A significant amount of work has been done under this grant without having been written up as yet. Some of the leads followed have not panned out. Some of the work has been interrupted awaiting better data, and some of the work, due to delays in receipt of the data, is just beginning. In the last category is the analysis of the 1971-73 NLS Young Men Tapes. We received these tapes only at the end of 1976. It will take some time to assimilate them into our computer system and we will not have any substantive results ready before late Spring or the early Summer of 1977.

A short list of initiated but yet unfinished projects would include:

(1) Analysis of quality of data. A beginning has been made in estimating the quality of responses by sons about the socio-economic background of their parents by examining directly comparable data for fathers from the NLS Young Men who could be identified in the Older Men tape. This work, initiated by Stephen Messner, is still incomplete, as is also a similar project based on our brothers and sisters match. We hope that Thomas Stoker will work on this in 1977. A similar questions was asked by William Marmol about the internal validity of IQ scores based on different test instruments. This work also awaits completion.

(2) The whole issue of the role and meaning of "occupation" in the process of economic achievement of individuals remains to be explored. The use of Duncan SES scores or occupational mean incomes to scale the occupational information raises many knotty statistical issues. Some of these were discussed in [37]. It is our intention to try to develop more appropriate models in the future for incorporating the occupational information into the postulated causal structure. In particular, the time series nature of our data should allow us to distinguish between the permanent and transitory effects of being in an occupation and to explore the distinction between the role of occupation as identifying the successful individuals in our sample and their role as modifiers of the path to success or failure.

(3) Analyses of larger family groupings. To date we have limited our analyses mainly to pairs of brothers. There is also

a non-neglible number of triples in our data, in particular if we extend our match to brother and sister sets. The analysis of groups of unequal size is conceptually straightforward but has not been programmed or executed yet.

(4) Much of our returns to schooling analysis focused on the explanation of differences in wage rates, taking labor force participation, hours worked, and unemployment as exogeneous. Part of the return to schooling, however, is the difference in work and leisure opportunities that it provides and the reduction in variability of employment that it induces. A more complete model, incorporating labor supply responses, would take this into account. We have looked at total earnings [33] in addition to wage rates, but have yet to estimate a simultaneous system, with annual hours worked as another dependent variable.

(5) The possibility of selection bias in our sample remains to be explored. We have, by and large, carried along parallel analyses for the sample of those for whom good IQ scores were available and the total sample, including also those with missing IQ scores. We have not, however, analyzed yet extensively the consequences of limiting our samples to out-of-school youths. This work is now in progress.

(6) The possibility that the large college cohorts of the 1970s will suffer throughout their careers from "excessive" numbers deserves further analysis. The issue can be formally described in terms of elasticities of substitution between workers of various ages and skill levels. If the elasticities are high, the losses of the cohorts of the 1970s will diffuse to the rest of the college work force. If they are low, significant intergenerational income differences will persist over time.

(7) The impact of poor job opportunities and relatively low incomes on the job satisfaction and market behavior of the graduates of the 1970s should be explored. On the one hand, one might expect overqualified workers to be especially dissatisfied and possibly create market problems in the future. On the other hand, the situation of an oversupply of graduates could produce

desirable changes in the nature of work. A small grant from the Earhart Foundation will be used to analyze these possibilities.

(8) In spite of much work on the market for college graduates there is still very little information on the determinents of demand in the market. We lack adequate data or knowledge about factors that determine the demand for different skills and we know little about demand behavior at the enterprise-level, or about the possibilities for skill substitution. The "active market" hypothesis, which guided much of our work assumes that most of the adjustments to disequilibria occur at the new-hires, entry-job levels and impinge primarily on the young. This hypothesis needs, however, more analysis and testing than it has received to date.

Another way of looking at what we have accomplished and what still remains to be done is to analyze in some detail the promises made in our original grant proposal. We are reproducing here the abstract from this proposal, having added only numbers identifying particular sentences and clauses to make subsequent discussion easier.

Abstract of Grant Proposal

(1) The proposal contemplates an intensive analysis of the data collected by the National Longitudinal Surveys, concentrating particularly on the experience of young men and young women, but collating them also with data on experience and background of other family members available in the parallel surveys. (2) The primary emphasis will be on an analysis of the effects of interruptions and work experience on educational attainment and subsequent economic success of the individuals. (3) Returns to different types of training and experience will also be computed and (4) the family social background-ability-schooling nexus reexamined. (5) The impact of recently changing market conditions for highly educated new young entrants into the labor market will be observed and the responses to it examined. (6) The work will be based on econometric analyses of the combined set of individual time series-cross section observations, with special attention to errors of measurement in the main variables of interest. (7) Newly developed estimation methods for models with unobserved components of variance will be used and elaborated further. (8) The results of this research should allow us to evaluate better current proposals for reforming the institutions serving our youth, in particular those proposals that call for increased work experience as part of the school setting.

Evaluation of Delivery Three Years Later

(1) This was largely accomplished, though there has been less analysis of the family member data than was perhaps originally contemplated.

(2) Because of data difficulties, see [35], this came to have a secondary emphasis in the project rather than primary, but significant work was accomplished nevertheless.

(3) Yes, but perhaps to a more limited extent than could be read into the original phrase. See [16].

(4) This represented one of the major foci of the project and resulted in a whole series of papers. [6,8,10,11,12,31,33,34,36].

(5) This was the other major focus of the project, culminating in Freeman's book [22,28].

(6) It was, though we did not reach the time-series cross-section aspects of the analysis until rather late in the project.

(7) Yes. See [8,9, 6-12 and 30 and 36].

(8) Perhaps too strong. Analysis did show that work experience while in school does not appear to subtract from subsequent scholastic or economic achievement. See [35].

It would appear to us that we have largely kept the promises made in the original proposal.

VIII. Budget Note

The major variance in expenditures from the original budget was in spending significantly more on computer work and significantly less on research assistance.

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March 1977

Estimating the Returns to Schooling: A Progress Report*

My interest in this topic originated in earlier work on sources of growth and in particular in the attempt to estimate the contribution of schooling to growth in aggregate productivity (see Griliches 1963 and 1967, and Jorgenson and Griliches 1967). These efforts were based on computing indexes of schooling or "quality" of the labor force with observed earnings (or income) by schooling categories as their weights. Such computations assumed that (a) differences in earnings correspond to differences in contributions to national (or sectoral) output and (b), that they are in fact due to differences in schooling and not to other variables such as ability or family status which happen to be correlated with schooling. The first assumption has been challenged for being based on marginal productivity theory and competitive market assumptions and for ignoring the possibility that social and private returns to schooling may diverge even in perfectly competitive markets (cf. Spence 1974). I have tried to review and answer some of these challenges in several earlier papers (Griliches 1970 and 1976) and will not pursue them further here except to note that most of these attacks apply as well to the whole system of national product accounts and to the problem of estimating returns to any kind of investment. I want to deal here

*I am indebted to the NIE (Grant No. NE-G-00-3-0202) and NSF (Grant No. SOC 73-05374 A03) for supporting this range of work.

primarily with the second range of issues, the compounding of the effects of schooling with those of other possibly important left out factors, issues that are more particular and more directly related to the study of education and the returns to it.

The immediate and most important challenge to the original estimates of the contribution of schooling to economic growth was the issue of "ability." To what extent did observed income differentials exaggerate the contribution of schooling because of a positive correlation between native ability and the levels of schooling achieved by different parts of the population? There were rather conflicting views on this at that time (early to mid 60's). Denison (1964), for example, claimed (on the basis of very little data) that as much as 40 percent of the observed income differentials could be due to the correlation of schooling with ability. This seemed rather high to me and I embarked on a search for data that would throw some light on this topic. I have still to emerge from this search.

The first and most obvious thing to do is to find data on both schooling and ability and to hold ability constant in calculating the appropriate returns to schooling. The first large scale data set analyzed by me and William Mason (1972) was the NORC-CPS 1964 Veterans match consisting of U.S. army veterans who were under 35 years of age in 1964 with data on earnings, schooling before and after service in the Armed Forces, family and other demographic background data, and AFQT (Armed Forces Qualification Test) scores. Using AFQT as the "ability" measure

resulted in the conclusion that bias in the estimated returns to schooling from this source was smaller than had been expected: on the order of 10 - 15 percent or about 1 percentage point of the estimated rate of return of about 6 percent. This conclusion was recently supported by Gary Chamberlain's (1977) reanalysis of these same data using more advanced statistical techniques.

The NORC-Veterans data set was somewhat peculiar and unrepresentative both because of its limitation to army veterans and because we had to rely on AFQT as a measure of "ability." The AFQT was given rather late in a young man's career (ages 17 - 19) and hence was not really a measure of native ability. Moreover, given its slant as an army qualification test, it was not clear whether it represented adequately the range of abilities important for subsequent economic success. This led me to the analysis of the National Longitudinal Survey of Young Men (one of the Parnes Tapes), a random sample of the cohort of young men who were 14 to 24 years of age in 1966. The advantage of these data is in their representativeness, in the fact that these young men have been followed up annually between 1966 and 1971 and again in 1973, providing a very rich source of data for analysis, and in their inclusion of data on IQ type scores collected from the high schools of the respondents. The drawback of these data is the youth of this cohort, but that is diminishing over time, as more data are collected and as the cohort continues to age.

An analysis of the wage rates and earnings of the NLS Young Men, reported in Griliches (1976 b and c) confirmed the

earlier NORC-CPS Veterans based results: the effect of leaving out IQ type measures on the estimated schooling coefficients is minor, on the order of less than .01. Both ability and family background are important in determining the ultimate economic success of individuals but they work largely through their effect on schooling rather than independently.

These results, particularly the relatively small role attributed to "ability" (net of its effect on schooling) in determining earnings were not all that plausible and met with some resistance. Three areas of possible bias have to be examined before they are given full credence: 1) The available test scores may be subject to large random errors at the individual level which would bias downward the estimated effect of true ability; 2) Ability may be important but the particular abilities which are reflected in wage and income differentials may not be measured adequately or at all by cognitive tests such as AFQT or IQ; 3) There may be other yet unspecified sources of bias in our data and modes of analysis.

We first tackled the errors in variables problem. To get consistent estimates of the relationship of interest in the presence of random errors in one's "independent" variables one needs to bring in additional "instrumental" variables into the model, variables that are correlated with the systematic portion of the affected variables but not with the errors in it. These can be of three kinds: background variables such as mother's schooling which are assumed to affect true ability but not wages (holding schooling and actual ability constant), parallel replicated readings on the same type of variable -- on the same individuals, such as other test scores whose measurement errors are

assumed to be independent of each other, and parallel measures (tests) on other related individuals such as siblings which could be assumed to be correlated with the individual's true ability but not with the errors in its measurement.

The use of background variables as instruments was described already in the Griliches-Mason (1972) paper. Since the NLS data contained two tests (IQ and KWW - a test of the Knowledge of the World of Work), a more elaborate instrumental variables procedure was used and reported on in Griliches (1976 b, c, and 1977). The econometric problems associated with the use of such models were surveyed in Griliches (1974) and (1977). The actual results of these more elaborate estimation procedures were not all that different: the impact of true ability on earnings was estimated to be higher than before, but this change in the estimated ability coefficients led to very little change in the estimate of the schooling coefficient or to any revision in the role attributed to ability in accounting for the observed differences in earnings across individuals. They did imply, however, very large errors in the observed test scores, amounting to about half or more of the observed variance in them. This raised the following problem: The standard psychometric literature indicated that simple random (test-retest) measurement errors do not account for more than 20 percent in the variance of such tests. We, however, got much higher numbers. Either these tests are significantly worse than psychologists have led us to believe or a large fraction of the true IQ variance may be irrelevant in determining wage differentials across individuals. Much of the

difference in IQ may not matter in terms of their effect on the earnings potential of individuals after their effect on his achieved level of schooling has already been taken into account. The "ability" we want for our models may not be IQ. Moreover, this view throws doubt on the assumption that "errors" in IQ are uncorrelated with everything else, especially schooling. They may be irrelevant for income but may still have an effect on schooling.

Such concerns and the desire for more and better instrumental variables lead us to search for and use data on siblings. Given data on several individuals who share a common attribute one can devise a method for estimating the returns to schooling even if such attributes are not observed directly. The basic idea here is that the unobservable ability is postulated to affect several variables and or individuals at the same time. Thus there is, in a sense, replication, more than one observation on the effect of the same unobservable. This allows one to estimate the general properties of that variable and to adjust for it in estimating the net impact of schooling. The econometric details of such siblings (variance-components) models are given in Chamberlain and Griliches (1975 and 1976), Griliches (1974), and Chamberlain (1976). The data sets we analyzed consist of 156 pairs of brothers collected by Gorseline (1932) in 1928 in Indiana and 292 pairs of brothers from the NLS Young Men cohort with data on their schooling and occupational expectations and 161 pairs from the same survey with data on actual schooling

and wages. The results of all this are roughly as follows: If one identifies "ability" with the thing that is measured (albeit imperfectly) by test scores and accepts the genetic model which postulates that family members are positively correlated on this, than the unobservable variable that fits these requirements seems to have little to do with earnings beyond its indirect effect via schooling. If one expands the model to allow for several unobserved factors or abilities, then the factor that is common to borthers and has an effect on earnings appears to have little to do with test scores. In either case the original estimates of the contribution of schooling are largely upheld.

Up to now we have been largely leaning over backwards, looking for possible reasons why the estimated returns to schooling may be too high. But this is a rather biased approach. There are other things that may be wrong with these estimates besides inadequate control for ability differences. For example, schooling itself may be measured with significant error, quality variations in schooling are largely ignored, and there may be self selection in the sample: those who can earn a higher income currently are more likely to drop out of school than others. All this points to the need to give the same kind of careful treatment to the schooling variable as has been lavished on the ability concept. A step in this direction is reported in Griliches (1977) where schooling is treated as an endogeneous variable, subject to both the possibility of errors and interdependence with the disturbances in the income equation, in parallel with the ability variable. The

results reported there indicate that if anything we might be under estimating the contribution of schooling to earnings rather than overestimating it.

To date, all of the new work and new data support the original conclusions: The contribution of the rising schooling level of the labor force to U.S. economic growth during the 1940's, 1950's, and 1960's has been substantial, on the order of a third of the measured (raw) growth in total factor productivity. While this number is subject to various reservations, caveats, and uncertainties, it does not appear to be seriously and systematically biased upwards because of inadequate control for differences in ability.

As with any long term research project, there are a number of "soft" areas in our work that require and will receive more attention in the future. As noted earlier, our samples are very young. Also, because of the concentration on sub-samples with "good" data, we tended to exclude those still in school and those with missing IQ scores. All this raises questions about the representativeness of our samples and the possibility that self--selection of respondents (in and out of school or with respect to the willingness to allow access to their IQ scores) may have biased our resuls in some unknown way. We did recompute the NORC-CPS Veterans Sample equations limiting them to those over 30 years old and found little change in the results. The NLS data allow us to watch our young men as they age. For this reason we soon will be recomputing our earlier estimates using the newly available 1971 and 1973 surveys and we intend to keep checking on them in the future as later surveys become available.

Also this will help somewhat with the representativeness problem, as larger fractions of the cohort enter the labor force. In the near future we also intend to explore recently developed statistical methods for dealing with sample selection bias (cf. Heckman, 1976 and Maddala, 1976), adapting them also to the missing observation problem.

During this period substantial work has also been done by others on this range of problems. I will not attempt to review it all here except to point out a few of the more important and closely related lines of research (see Welch, 1975 for another review). Jencks and his associates (Jencks and Brown, 1976) have also reanalyzed the NORC-CPS Veterans Sample and have analyzed several sets of data on brothers (NORC, Talent, and Kalamazoo); Hauser and his associates (Hauser and Daymont, 1976) have been following up the 1957 Wisconsin Cohort of high school seniors, Olneck (1975) has analyzed data on brothers from the town of Kalamazoo in Michigan, and Taubman and his associates (1975) have been analyzing data on twins based on an NRC sample of Veterans. All these studies differ in coverage, variable definitions and modes of analysis. By and large, however, where comparable their results are not inconsistent with ours. Studies that focus on the contribution of measured ability to the variance of earnings, net of schooling, find rather small effects and also relatively small absolute biases in the schooling coefficient. Whether the resulting bias is "large" percentage-wise depends on what else has been held constant in the model. Holding work experience constant Hauser and Daymont (1976) found

only a 13 percent upward bias in the estimated High School--College earnings differential for the period 1965-1971, with part of this bias estimate being due to introduction of parental income in addition to the mental ability measures in the equation. Larger effects are obtained by Olneck in his analysis of Kalamazoo brothers and by Behrman, Taubman and Wales (1976) in their analysis of the NRC twins data. In both these cases, the effects come not from the introduction of test scores per se, but from estimating the effect of schooling on earnings from the "within" samples, from differences in the experience of brothers or twins. The problem with this type of approach is that if there are also errors in the measurement of schooling, their relative importance will be magnified when comparisons are made only between brothers or twins. Moreover, adding additional variables such as test scores to the equation only exacerbates the problem (cf. Griliches, 1977 section VI for a more detailed discussion of this point). Thus, for example, all of the rather large bias in the schooling coefficient estimated by Behrman, Taubman, and Wales from a comparison of earnings differences between monozygotic and dizygotic twins would disappear if one allowed for 15 percent error in the observed variance of schooling. That schooling could be subject to that much measurement error is suggested by the recent work of Bishop (1974) and Bielby, Hauser, and Featherman (1976). Their error estimates range from 10 to 20 percent of the observed variance of schooling. In short, twin and brother studies have yet to tackle effectively the problem of errors. Until that is done, it is difficult to interpret their

results except to note again that while family members seem to share a common experience, there is enough variance in the data to belie the view that the family of origin is an"unriddable" millstone around the neck of the individual. Individuals do move and transcend their family origins and do succeed or fail with only the weakest relation to the test scores attached to them early in their career. While social science models are couched in deterministic language, actual individual experiences are much more open-ended. The vagaries of time, place, and accident overshadow the stylized order suggested by our models.

To capture and describe this state of flux better we shall be turning next to a more explicit time series view of the same individuals, tracing out their experience from 1966 through 1973, in an effort to provide an alternative and we hope more illuminating account of the process of education, labor force entry, and economic development of the individual.

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Schooling Interruption, Work While in School, and the Returns from Schooling*

Recent educational discussions have suggested that the institutions serving youth are incomplete in certain specific ways and have recommended an expansion in opportunities for work--experience, age-integration, and national service (see, in particular, the PSAC Panel Report on Youth: Transition to Adulthood, 1974). Such recommendations make sense only if (a) the suggested experiences are in fact valuable, and (b) they can be had at little or no cost to academic achievement provided by current schooling institutions. The latter implies either that there is quite a bit of slack in the current educational set-up within which these additional experiences can be fitted in or that some of the current schooling activities have been pushed too far for some youngsters, implying that a shift away from schooling towards other more valuable experiences is warranted and effectively costless.

Since the validity of these assumptions is dubious, the available evidence should be scrutinized carefully before such recommendations are acted upon. This paper reports the results of an attempt to explore some of these issues using data from the

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National Longitudinal Survey of Young Men, focusing on the effects of school interruption and of work while in school on subsequent economic success in the labor market as measured by wage rates received after shool completion. Some associated results, based on another data set (The National Longitudinal Survey of the High School Class of 1972) will also be reported.[1]

The NLS Young Men data set has been described in detail elsewhere (cf. Griliches 1976a and 1976b and Parnes et al). It is based on a national sample of the civilian non-institutional population of males who were 14 to 24 years old in 1966. Blacks were oversampled in a 3 to 1 ratio. The original sample consisted of 5225 individuals of whom 3734 were white. By 1970 about 24 percent of the original sample was lost, 12 percent of it only temporarily (to the army). Data are currently available from the 1966 through 1970 surveys of these individuals. In addition to the usual socio-demographic interview questions, all youths who had completed 9th grade by 1966 were asked to sign waivers allowing their schools to disclose to the Census Bureau their scores on various tests and other background materials. The resulting "School Survey" yielded data on different mental ability scores for 3375 individuals. These were rescored into IQ equivalents at Ohio State University.

In my earlier studies (Griliches 1976a, 1976b, 1977) these data were analyzed in some detail, focusing on estimating the "net" effect of schooling on the logarithm of the wage rate,

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[1] I am indebted to W. M. Epstein for these results.

holding ability, experience and other factors constant. I will not retrace this work here. Rather, I shall start where the last paper (1976b) leaves off, with the analysis of the determinants of the 1970 level of wage rates of these young men (those out of school by 1970 with relevant data on wage rates and work experience) and ask whether adding information on school interruption or the extent of work while in school explains any of the still rather large amount of unexplained variance in wage rates among these young men. Implicitly, I am considering school interruption and work while in school as possibly affecting the true level of human capital accumulated for a given nominal level of schooling. They are quality of schooling type variables and are assumed to affect wage rates directly. School interruption and work while in school may also have larger, indirect effects via their influence on the ultimately accumulated amount of schooling and work experience. I will look for such effects too, but the primary focus will be on the search for the direct effect, if any. Unfortunately, the interpretation of the results will be obscured by the fact that neither school interruption nor the decision whether to work or not while in school is made randomly. For example, those young men who have experienced at least one interruption of schooling by 1969 are clearly not a random drawing from the whole cohort. Whether their subsequent experience can be taken as representative is rather dubious. While an attempt will be made to circumvent some of this problem by controlling for several relevant and measurable variables such as race or IQ, doubts will linger on. What follows then is offered not in the spirit of the final word on the subject but as a report of an exploration

of an albeit imperfect but still somewhat relevant data set. There are hardly any other data sources available with a bearing on these topics.[2]

II. School Interruption

The NLS asked a question about schooling interruption in 1966 and again in 1969. As of 1969 355 young men had reported that they had had an interruption of their schooling lasting a school year or more, the average interruption lasts 1.9 years. There does not seem to be much that can be learned from the "reasons" reported for these interruptions. Of the total of 355, 132 reported that they did it to go to work, 47 to do military service, 20 because of illness, 11 because they disliked school, 5 because of lack of ability, while the rest (140) provided no reasons for the interruption. The numbers are too small to base a more detailed analysis on them. As of 1970, 185 of these young men were out of school and had reported data on wage rates and work experience. They constitute nine percent of all those not enrolled in school in 1970 with "good data" (see Table 2 for more details).

In this section we ask whether the schooling interruption was costly for these (185) young men in the sense that they were receiving a lower wage rate in 1970 than other young men with the same level of schooling and work experience. The answer is summarized in Table 1. In short, there is no effect. The interruption does not appear to have cost them anything except for postponing the collection of the returns from schooling by the

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[2] A Michigan study (Featherman and Carter, 1976) has some information on schooling interruption. It will be discussed below. Other data sets such as the NLSHS72 have yet no relevant measures of subsequent success. It is still "too early" to analyze them from this point of view.

Table 1: Schooling Interruption Variables in the Wage Function. NLS Not-enrolled Young Men in 1970, N = 2136. Dependent Variable: LWAGE 70.

Equation No.	Coefficients of SC	IQ	DSINT69	SCINT69	Other Variables in Equation	R^2
1.	.068 (17.9)	.0020 (3.0)			AFEXP, XBT, SMSA, BLACK, RNS, BRNS, DIQ	.394
2.	.068 (17.7)	.0020 (3.0)	.025 (.95)		AFEXP, XBT, SMSA, BLACK, RNS, BRNS, DIQ	.394
3.	.061 (11.8)	.0020 (2.9)	.020 (.5)	.006 (.4)	AFEXP, XBT, SMSA, BLACK, RNS, BRNS, DIQ, NASINT69	.398

Estimated t-ratios in parentheses.

LWAGE70 - Natural logarithm of the hourly wage rate received on the current or last job, as of 1970.

SC - years of school completed, as of 1970.

IQ - IQ test score.

DSINT69 - Dummy variable (=1, otherwise 0) if respondent had at least one schooling interruption as of 1969.

SCINT69 - Length of the schooling interruption, in years.

NASINT69 - Schooling interruption question not answered.

AFEXP - Armed Forces Service, in years

XBT = exp -.1 EXP70, EXP70 - work experience as of 1970 in years.

SMSA - Respondent in SMSA in 1970.

RNS - Region now south.

BLACK - Black

BRNS - Black and RNS

DIQ - IQ score missing

length of the interruption. Allowing either for the fact of an interruption (eq.2) or also for its length (eq.3) does not improve the fit of the wage function.[3] The estimated coefficients while not statistically significant are in fact positive.

Puzzling over these results leads one to the realization that the group that reports a schooling interruption is not a random drawing from the whole population. What we actually have are not all those who have interrupted (and also stopped) their schooling, but only those who have returned, who interrupted their interruption. Only those who decided to go back to school will be counted as having had an interruption. But presumably among all those who stopped school, the ones who go back expect to get more from schooling than those who do not return. It is not surprising then that by and large they are right. Only those for whom the interruption is largely costless will terminate it and return to school.

That the group with interruptions is rather special can be seen clearly in Table 2. They are, not surprisingly, significantly older and have achieved more schooling than those without an interruption. But they also have higher IQ's, come from more affluent backgrounds, and blacks are underrepresented among them. As the result of the interruption they have more

[3] The R^2 of eq. 3 is slightly higher because of a significant negative coefficient for those individuals who did not answer the interruption question (either positively or negatively).

Table 2: NLS Young Men: Selected Characteristics of Different Subsamples by Schooling Interruptions as of 1969. Means and Standard Deviations

Variable	Original Sample as of 1966					1970: Not Enrolled with good data				
	Total	By Schooling Interruption				Total	By Schooling Interruption			
		None	1 year or less	More than 1 year	N.A.		None	1 year or less	More than 1 year	N.A.
N	5225	4751	222	133	119	2136	1938	124	61	13
Age 66	18.1 (3.2)									
Age 70		21.9	24.0	25.4	23.3	23.0 (3.3)	22.9	24.5	25.3	22.2
SC66	10.6 (2.4)									
SC70						11.9 (2.5)	11.8	13.1	13.0	13.5
IQ*	101.9 (15.9)	101.3	105.3	106.1	102.0	99.0 (15.3)	98.9	103.4	104.1	103.1
FOMY 14	5301 (2058)	5101	5314	5634	5651	4940 (1805)	4894	5271	5550	5752
Percent Black	29	29	17	11	23	26	27	19	11	15
EXPER 70						4.4 (3.2)	4.5	4.0	4.3	1.9

The numbers in parentheses are standard deviations

FOMY 14: Father's occupation when respondent was 14 scaled by 1959 median income of males in this occupation.

EXPER 70: cumulated post-schooling work experience as of 1970

IQ*: computed only from the "good IQ" portion of these samples

schooling but slightly less work experience than might be expected on the basis of their older age. For example, among the not enrolled in school the one year interruption group differs from those with no interruption by 1.6 years in age and 1.3 years in schooling, implying a +.3 difference in experience versus a -.5 years difference actually observed. This, however, may be an artifact of our data processing. "Experience" is measured often from the first full time job "after you have stopped going to school." It will, thus, often miss measuring the work experience accumulated while not in school but before one has finally stopped going to school.

In retrospect, the right way to analyze this problem would be to ask first who drops out from school and when and then ask about who returns to school among those who dropped out. As is, the data seem to imply that those who would be successful anyway in the schooling process lose little by dropping out for a while.[4] There is no evidence, however, to say that most of those who dropped out would do well to return to school.

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[4] Featherman and Carter (1976) analyze the effects of "discontinuities" in schooling on achieved schooling, schooling and occupational expectations, and current occupation and income, based on a sample of young men from the high schools of one county in Michigan. There were ultimately 340 cases in their sample of men aged 32 in 1972. They used three measures of discontinuity: 1) age-grade retardation at age 17. 2) Interruption of 6 months or more between the end of high school and the beginning of post-high school education, and 3) an interruption of 6 months or more during the post-high school education. Only the latter two are of interest to us. The first is not really a discontinuity but rather another measure of ability or educability. Their results are very similar to ours. The interruptions are not very highly related to background variables. They are related positively to total schooling, and seem to have no statistically significant effect on occupation or income net of the actual level of schooling attained.

III. Work While in School

There are a number of different ways that the effects of working while in school can be investigated using the NLS data. In the first survey (1966) all respondents were asked whether they worked in the last year of high school, the number of hours worked, the type and duration of job, and whether work interferred with school. Additional data are available from later surveys on the employment experience of those still enrolled in school.

We have defined several variables based on the responses to these questions:

HSWORK - Dummy variable, worked some time during his high school years, as of 1970.

HSEXP - Number of years worked while in high school.

CEXP - Number of years worked while in college.

SCHRSWK- Average hours per week worked while in school (both in high school and in college).

SINTER66-Work interfered with schooling, dummy variable for positive answer to question asked in 1966 survey. Question refers only to work during the last year of high school.

Additional dummy variables were defined for observations with missing data on these same variables: NAHSEXP, NACEXP, NASCHRSWK, and NAINTER.

Table 3 provides an idea of the distribution of these variables in our various samples. Limiting oneself to those with

10 grades of schooling completed or more (N = 3504 out of a total of 5225) about half of the relevant sample worked while in high school and about 63 percent had worked some time while in high school or college. Of those who worked while in high school, only about 7 percent reported that it interfered with their schooling. Those who had worked while in school were working an average of 18.6 hours per week and had accumulated by 1970 about two years of work experience during their schooling period.

The probability of working while in school and the intensity of this work seems to be very little related to the economic-demographic characteristics of the respondents. As distinct from the "interruptors" considered in the earlier section, "workers" are not a special group. Consider, for example, the probability of having worked while in high school among the class of all respondents with some high school ($S \geq 10$) with information on their work status while in high school (N=2674). A regression of this dummy (binary) dependent variable on 12 socio-economic background variables has an R^2 of only .04. Besides age, the only variables which attain statistical significance, which with over 2600 observations is not all that difficult, are "Culture," "Black," and "Together." The signs of these effects conflict somewhat with a priori expectations. The higher the "culture" index of the respondents home, the more likely he is to have worked during his high school years;[5] a "broken home"

[5]The "culture" index is based on the presence of newspapers, magazines, and library cards in the respondent's home when he was 14.

Table 3: Distribution of the Sample by Work While in School

Variable	A Total HS Sample (S≥10) N = 3504	 Total College Sample (S>12) N = 1463
Work Experience:		
NA	830	291
0	1391	629
<1	656	268
≤1	627	278
SCHRSWK		
NA	293	
0	1187	
<20	1537	
≤20	487	

B

1970 Not Enrolled Working Subsample With Good Data
N = 2136

	Fraction NA	Fraction Zero	Average (excluding NA's and zeros for non dummy variables)
HSWORK	.27		.52
HSEXP	.27	.40	1.75
CEXP	.27	.63	.65
SCHRSWK	.17	.34	18.6
SINTER 66	.04		.07

(the opposite of together) increases the likelihood of work while in high school; while being Black reduces the probability of work. Neither IQ nor father's occupation or education has a statistically significant or sizable effect of its own. Similar results arise when we examine the accumulated amount of high school work experience (HSEXP) or the intensity of work during school (SCHRSWK). The R^2 is .02 for HSEXP and .08 for SCHRSWK when regressed on the same set of background variables. IQ has a statistically significant negative effect while "culture" retains its positive effect. The IQ effect is rather small, however, a 10 point increase in IQ implying only half-an-hour less worked per week. When looked at in more detail, these results suggest a faint u-shaped relationship of leisure while in school to economic status variables. The more well-to-do and the more able are more likely to work while in high school but less likely to work very many hours during the school year. In the case of work while in college, the more able and the less well-to-do work somewhat more than the rest. Again, the explanatory power of background variables is almost nil. For the sample of all those with some college (S>12) and no missing information on work experience (N=1172), the R^2 of the regression of CEXP on 11 background variables is only .02.[6]

Some more detail is given in Table 4 which presents the distribution of the major high school work variables as of 1966 by three major background characteristics: home culture

[6]That is one reason why we are not presenting the detailed results for all these regressions. There is hardly anything there.

Table 4: Distribution of Work While in Last Year of High School (as of 1966) by Background Characteristics

By	Worked	Percent Worked Full Time	Average Hours Worked	Percent Work Interfered With School	N
	1	2	3	4	
Culture Index					
0	33	19	21.3	19	132
1	33	33	25.1	33	321
2	37	21	24.0	22	831
3	44	16	22.9	24	1736
Mother's Education					
≤7	34	22	21.8	35	307
8-11	40	21	23.5	21	908
12	43	17	23.8	17	1103
13-15	42	18	22.5	22	207
16+	36	10	18.0	21	191
IQ					
≤70	35	24	25.0	32	71
71-85	37	18	24.7	18	280
86-100	42	21	25.6	21	723
[illegible]-115	44	17	23.7	23	845
116+	41	10	19.2	20	529

Population: All those answering the worked while in last year of high school question in 1966 with schooling equal to 10 years or more as of 1966.

2. As percent of those who worked

3. For those working and reporting hours worked

4. Of those working and answering the interference question

index, mother's education, and the respondents IQ. The conclusions are similar. By and large, more advantaged youths are likely to work more frequently but slightly less intensively than less advantaged youths.

An examination of a more recent and larger body of data, the National Longitudinal Study of the high school class of 1972 yields similar results.[7] In this study over 23,000 respondents were asked whether they worked during their last year in high school and how much they worked. Data are available on a variety of mental ability tests and socio-demographic background variables for these individuals. While the frequency of working is somewhat higher than in the NLS Young Men tapes analyzed by us, about two-thirds versus a half, there is almost no visible relation of the frequency of work or the amount of work to such variables as father's occupation, parental education, a home "culture" index, family income, class, rank, or measured mental ability (TEST - an average of the six texts taken in the course of the base year surveyed). Table 5 is presented as an example of the various tabulations from this data set. It records the distribution of respondents by hours worked during their last year of high school, cross classified by their average test scores, and compares it to an "expected" cell frequency based on the assumption of independence between test scores and the

7. I am indebted to W. Epstein for making these tabulations available to me.

Table 5: Distribution of Students by Hours Worked in Last Year of High School and Composite Test Scores. National Longitudinal Study of the High School Class of 1972.

Test Score ($\bar{T}$=50 σ_T=7)		Hours Worked Per Week: None	15 or less	16-25	26 or more	Row Total	NA
≤ 35	E	153	208	142	112		
	A	171	221	84	136	615	16
36-42	E	592	807	550	436		
	A	678	688	449	571	2386	26
43-49	E	1109	1511	1031	816		
	A	1065	1338	1064	1000	4467	34
50-56	E	1298	1770	1206	950		
	A	1191	1854	1327	857	5229	26
57+	E	757	1032	704	557		
	A	803	1228	706	313	3050	13
Column Total		3908	5329	3633	2877	15747	115
NA		2009	1203	1064	738	5014	2436

Grand Total = 23,312

E - Expected, computed on the basis of assuming independence between rows and columns (based on a more detailed 8 by 7 table).

A - Actual

propensity to work. There are some deviations of actual from expected and with the very large sample size these are clearly statistically significant but they are rather minor in absolute size. There is some indication that among non-workers both the less able and the very able are slightly over-represented. The less able, however, are also over represented among those working longer hours per week (26 or more), while they very able are not. Even though there are some discrepancies, especially in the very able high hours corner, the absolute fit of the independence hypothesis is surprisingly high.

We next examine the effect of having worked while in school on the subsequently realized market wage rate. Table 6 is essentially a continuation of Table 1 with school work variables substituting for the school interruption variables. Accumulated work experience during high school (HSEXP) has no significant effect on subsequent wage rates. Work while in college has a mild positive effect on wages on the order of a half of what the contribution of regular work experience would be. This may be related to a higher connection with post school work at this level. The intensity of work while in school (SCHRSWK) has a mild positive effect on wages (2 percent at 20 hours per week) which is barely statistically significant. Whether work while in high school interferred with school (SINTER66) or not seems to have no statistically significant effect on later wages. If anything the observed effect is positive.[8] By and large, none

[8]This was also the case in the earlier analysis of these data by W. Epstein. Those who reported interference appeared to be doing slightly better. He interpreted it as the effect of having a more real and possibly more interesting job.

Table 6: Coefficients of Work While in School Variables in a Wage Function. Dependent Variable: Log Wage 70 NLS Young Men Not Enrolled in 1970, N = 2136

EQ	Coefficients of (t-ratios) HSEXP	CEXP	SCHRSWK	SINTER 66	R^2 (SEE)
A					
1.	.002 (.3)				.395 (.343)
2.	-.001 (.1)	.037 (2.1)			.397 (.343)
3.	-.006 (.8)	.027 (1.5)	.001 (1.6)	.039 (1.3)	.406 (.341)
B Older Subsample					
Age 24+, EXP≥1	-.009	.023	.001	.008	.387
N = 969	(.9)	(.9)	(1.2)	(.2)	(.341)

Other variables in equation: SC, IQ, DIQ, XBT, SMSA, RNS, BLACK, BRNS, and missing observations dummies: NAHSEXP, NACEXP, NASCHRSWK, and NAINTER.

HSEXP - work experience while in high school, in years

CEXP - work experience while in college, in years

SCHRSWK - average hours per week worked while in school

SINTER66 - work in high school interfered with schooling (as of 1966).

See notes to Table 1 (and text) for the definition of other variables

of these variables have large or very significant effects on wage rates as of 1970.

These results could be due, however, to the extreme youth of this sample. It may take more time for such effects to show up. To check on this possibility, I restricted the sample to its "older" part, those 24 years and older with at least one year of post school work experience. The resulting subsample had a mean age of 26 in 1970. The last row of Table 6 lists the results for this subsample. There is hardly any difference between the total sample and this subsample as far as the coefficients of the work while in school variables are concerned. They are somewhat less significant as the result of the smaller sample size but their magnitudes are about the same (except for the SINTER coefficient which drops further into insignificance). It appears that our finding of "no effect" is not an artifact. Going to a significantly older subsample leaves the results unchanged.[9]

Another way of looking for the effects of work while in school is to examine the educational and occupational expectations of these youths. The NLS Surveys asked about expected education and occupation in 1966 and 1970 (and in some of the intervening years). We scaled the occupational information by the logarithm of the median annual income of all males in this

[9]Of course we cannot disprove the possibility that major effects will show up when these young men are in their thirties or forties. But there was no indication of an age interaction in the early to late twenties range.

occupation in 1959 (the resulting variable is called EXLOMY). Again there is no significant effect of having worked while in high school on educational and occupational expectations either in 1966 or 1970 or on their change between 1966 and 1970. There is an indication that those youths who found that work interfered with their schooling reported higher occupational expectations in 1970 (even holding schooling expectations constant) than those who did not find that work interfered. But that is about it. Since there was hardly anything there, I am not reproducing the results here.

A somewhat more interesting set of relationship is described in Table 7 which presents the distribution of respondents from the earlier mentioned study of the high school class of 1972 by hours worked while in school and by hours of homework done for school. Again, there is little relationship between home and market work hours. In the extremes (the corners of the table) a small effect is observable. Those with no homework or those who do not do any are somewhat more likely to be working long hours while in school, while those who do much homework are somewhat over represented among those who work little outside and under represented among those who work a lot. But for the great bulk of respondents, those working less than 25 hours outside and doing homework (but less than 10 hours per week) there is practically no relationship between these two activities. Engaged in moderation, they do not seem to impinge on each other.

Table 7: Distribution of Respondents by Hours Worked During Last Year of High School and by Homework Hours National Longitudinal Study of the High School Class of 1972.

Homework		Hours Worked 0	1-15	16-25	26+	Row Total	NA
None assigned							
	E	192	261	180	141		
	A	168	216	185	206	775	4
Does Not Do							
	E	261	355	244	192		
	A	213	302	260	277	1052	4
Hours							
<5	E	2212	3004	2069	1624		
	A	2136	2921	2164	1623	8907	36
5-10	E	1214	1648	1136	891		
	A	1308	1773	1064	743	4888	34
>10	E	223	303	208	164		
	A	276	358	164	99	897	4
Column Total		4901	5570	3837	3011	16519	82
N.A.		1816	962	860	604	4242	2469

Grand Total: 23312

A - Actual

E - Expected on the assumption of independence (based on a slightly more detailed 5 by 8 table)

N.A. - Not available

IV. Summary

We have taken another look at the effects of the interruption of schooling and of work while in school on subsequent economic success of young men with negative results. There is no evidence in our data that a schooling interruption results in additional costs beyond the direct ones of having postponed the end of schooling by the length of the interruption. This conclusion is very much tempered by the realization that our sample of school interrupters is not random. We can only observe those who decided to go back to school. A more complete and detailed model would start from the decision to drop out from school, add to it an equation for the decision to return to school and integrate them into an analysis of the ultimate consequences of the schooling path taken. Such a model is beyond the scope of this paper though I hope to pursue this further at a later date. But even the more elaborate approach will be bedeviled by the fact of self-selection on unobservable characteristics such as ability and motivation. While newer methods of statistical analysis (see Griliches 1974, Chamberlain and Griliches 1975 and Heckman 1976) may help here a bit, it would be much better if we could gain access to data where the interruption was forced on individuals exogeneously, by war or other events, and was not of their own making. An analysis of the experience of veterans of World War II and the Korean conflict might yield some insights into this problem. More interesting, perhaps, would be a cross-country analysis of the cohorts of 1925-1935

in Europe. World War II interrupted the schooling of a large number of individuals at different levels of schooling and for different lengths of time in the various countries of Europe. This cohort is now over 40 years old and the ultimate economic achievement of its members is well defined. While it would be difficult and expensive, such a study does not appear to be infeasible. Many of these countries have collected detailed socio-economic surveys or censuses which should allow a cross country comparison of the effects of different lengths of interruption on the subsequent economic experience of the various cohorts.

As far as work in school is concerned, our results are on somewhat firmer ground. Again there is no evidence that work while in school is costly to the individuals in terms of their subsequent economic success. If anything, especially at the college level, the little evidence there is goes the other way. Thus, expanding work opportunities for the young both at the high school and college level is unlikely to detract from their subsequent academic and economic achievement.

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The Depressed College Job Market:

Issues and Implications

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The Depressed College Job Market: Issues and Implications

The relation between education and the job market and the economic return to investments in schooling have recently become major themes in discussions of education. Some have expressed the belief that current institutions are doing an imperfect job in preparing young persons for the job market (see, for example, the Report of the Panel on Youth of the President's Science Advisory Committee, Youth: Transition to Adulthood). Others have called for curricular changes in the direction of career education. Throughout the society, questions have arisen regarding the economic rewards and costs of advanced schooling at the junior and community college, bachelor's, and post graduate levels. Considerable attention has been given to the job problems of the graduating classes of the 1970s. The Bureau of Labor Statistics, among others, forecasts significant surpluses of college graduates through 1985, in sharp contrast to traditional forecasts of shortages. Diverse policy-oriented groups have begun to consider policies to adjust graduate training to the new economic realities.[1]

The concerns and issues in higher education in the 1970s differ, almost as mirror images, from those of preceding decades when national attention focused on shortages of specialized manpower and the need to expand the higher education system. The change in orientation raises important questions about the actual situation in the 1970s, our perception and response to it, and possible future developments. How extensive

is the widely heralded decline in the economic rewards to higher education? Which fields and groups of persons have been most extremely affected by the changing market? What impact have changes in the economic rewards and costs had on the pattern of college-going? Will the depressed market for graduates continue into the future or will the strong market of the 1960s be restored in the near future? What are the broad social consequences of the changed economic calculus of higher education? What are the lessons or implications for policy?

This report examines these interrelated questions from the perspective of research recently completed under NIE grant No. 6-003-0202 to Harvard University. It summarizes the results of the portion of the grant work relating to the questions as to where, for what types of schooling and at which age level the returns to education accrue. Because of the importance and controversial nature of some of the findings and interpretations, some attention is given to extant criticisms of the research results and to potential areas of interpretation "on which reasonable men may disagree."

I. What We Know (or think we know) About the Changing College Marketplace

A wide variety of evidence on the market for educated workers, analyzed in several reports as part of this project and in other studies as well, shows striking changes in the 1970s, compared to previous decades.[2] The most important features of change which emerge from these analyses can be summarized in five basic propositions which specify what we "know"

about the depressed marketplace.

Proposition 1: The labor market for the highly educated underwent a significant unprecedented downturn in the 1970s, which substantially reduced the economic rewards from college and graduate training, largely for young persons and new labor market entrants. The relative income of graduates dropped and, perhaps more importantly, the proportion obtaining traditional college level professional jobs declined markedly.

Proposition 2: The decline in income and employment opportunities had differential effects on various groups, with the rate of return to the college investments of black youngsters less adversely affected than those of whites, and new opportunities for women in primarily male college occupations partially offsetting the effects of the decline in the teachers market on their career prospects.

Proposition 3: The decline occurred differentially among fields, being most severe in liberal arts, academic, and research-oriented occupations, and at the doctorate level, and least severe in business-oriented professions, such as accounting, engineering and management.

Proposition 4: The historic upward trend in the proportion of young persons enrolling in college came to an end, with the propensity to go actually falling among young white males. In addition, there were significant changes in fields of study, apparently in response to changing market opportunities.

Proposition 5: The increased supply of college workers had adverse consequences for the white collar employment opportunities of less educated workers who found it increasingly difficult to obtain lower-level white-collar jobs.

In this section I examine some of the evidence underlying these propositions. Because of the way in which the market for educated workers operates, the analysis focuses on two indicators of market

conditions: salaries, which are especially good measures of the college job market because college-educated manpower rates are set directly by supply and demand rather than, as in unionized blue-collar markets, by collective bargaining; and job opportunities, broadly defined as the availability (number) of positions at given salaries in the area for which an individual has been trained. Opportunities are important because educated workers invariably find some sort of employment, making the quality of jobs, not the number employed or unemployed, the principal nonprice mode of adjustment. In addition, however, some attention must be given to other indicators of labor market conditions, such as rates of unemployment. To minimize the dangers of misreading cyclic or temporary changes in employment conditions for the type of long-run climacteric which merits serious concern, the situation of the seventies is continually compared to that of earlier decades.

The most sensitive indicator of the changing job market, given great stress here, is the economic position of young persons, particularly new college graduates and similarly aged high school and other personnel. Economic changes are likely to show up most dramatically and rapidly among new graduates for several reasons. First, nearly all new graduates but only few older workers are on the "active" job market in a given period, making the position of the former more immediately sensitive to fluctuations in the supply-demand balance. Second, firms will generally find it easier to alter hiring patterns for new personnel and starting salaries than to adjust the position of experienced personnel already in positions--transactions costs are greater in the latter case. Third, the regular hunt for college and high school graduates that operates

each spring and summer is likely to provide enterprises with more accurate and up-to-date information about economy-wide developments than intermittent changes in the status of the experienced. A plausible model of decision making would have firms alter overall salary patterns in response to signals from the "entry port" of young hires. If this argument is correct, the position of new graduates is a leading indicator of supply/demand conditions, to be followed in time by similar changes for other workers. Alternatively, however, it is possible that younger and older college graduates are very poor substitutes or even complements in the productive process so that the changed position of the young in the 1970s will "spillover" only moderately to older graduates. If this argument is correct, the graduates of the 1970s will continue to bear the brunt of the changed supply-demand balance in the future.

The Overall Decline: Proposition 1

The evidence that the labor market for the highly educated, especially new college graduates, underwent a major, unprecedented downturn in the 1970s is impressive. In terms of salaries, statistics on incomes and starting pay show a marked deterioration in the economic status of graduates relative to other workers. In terms of employment, an increasing number of college graduates ended up in positions outside of traditional college-level job areas. Other indicators, such as rates of unemployment, also worsened for the college trained.

The overall pattern of change in the earnings position of college graduates is examined in table 1, which compares several measures of the earnings of college graduates relative to the earnings of other workers from 1969, when the college marketplace was strong, to 1974 when it was substantially depressed. To minimize the impact of cyclic changes on the comparisons, the data relate to the earnings

Table 1 College to High School Income Ratios for Male Workers 1969-1974

Income Ratios	1969	1974	%Δ
1. College Grad./ High School Grad. 25+	1.53	1.35	-11.8
2. College Grad./ High School Grad., 25-34	1.39	1.16	-16.5
3. College Starting Salaries[a]/ Average Annual Earnings[b]	1.24	1.09	-12.1
4. Doctorate Starting Salaries[c]/Average Annual Earnings	2.18	1.78	-18.3

[a]Estimated as weighted average of starting salaries from Endicott series using as weights .35 (engineering), .05 (accounting), .20 (business administration) .40 (sales).

[b]1974 is approximate. Calculated from percentage change in average hourly earnings from 1973 to 1974. Average annual earnings relates to all full-time workers.

[c]Unweighted average of 8 Ph.D. fields

Source: U.S. Bureau of the Census, Current Population Reports, Series P-60 Consumer Income No. 75, p. 101, Table 47
No. 101, p. 116, Table 58.
College Placement Council, Men's Salary Survey (Bethlehem, Penn.), 1968-69, 1973-74).
F.W. Endicott, The Endicott Report: Trends in Employment of College Graduates, Northwestern University, 1948-74.
U.S. Department of Commerce, Survey of Current Business, national income editions

of year-round full-time workers and actual monthly salary rates. Annual income figures which include the income of those without work for part of the year show similar patterns.

The table shows a sizeable decrease in the relative position of the highly educated during the period under study, especially among the young. In line 1, which compares the income of all men with 4 years of college to the income of men with 4 years of high school, the income ratio drops from 1.53 to 1.35. In line 2, which focuses on 25 to 34 year olds, the income premium to the college trained drops even more, by 17%, from 1.39 to 1.16. In lines 3 and 4, which contrast the starting pay of bachelor's and doctorate graduates in business to average annual earnings of all full-time workers, similar results are obtained: in 1969 starting bachelors men earned 24% more than the average worker; in 1974 9% more. The advantage of beginning Ph.D.'s fell by 18%. It would be more appropriate, of course, to compare the starting pay of college workers with the starting pay of high school workers, rather than average annual earnings, but absence of a high school starting series makes such an analysis impossible. Use of average annual earnings is probably not too bad because the cross-section income profile for high school men is relatively flat and does not appear to have changed in the period under study. More detailed analysis of the CPS data tapes confirm the concentration of the decline among young graduates and suggest that older college graduates actually lost relatively little ground in incomes compared to older high school graduates (Freeman, 1977c).

Parallel to the drop in the relative income of college students was a deterioration in employment opportunities. This deterioration forced an unprecedented number of college graduates, particularly those starting their careers, into noncollege-level jobs, jobs outside their areas of study, or unemployment.

Table 2 examines this aspect of the changing college job market. It compares the types of jobs and difficulties in obtaining positions in 1969 with the situation in 1975. Lines 1 and 2, which give the most comprehensive statistics on the employment of graduates, show that the proportion employed in the traditional occupational area of the college-educated, the professions, fell sharply in the period, by 7 percentage points for men and 11 percentage points for women. Lines 3 and 4 tell a more drastic story about the employment problems of narrower groups, newly graduating education majors and Ph.D.s, for whom the 1960s were an especially good period and the 1970s the converse. In line 3 there is an extraordinarily large drop in the frequency with which education majors obtain teaching jobs; in line 4, there is a quadrupling in the fraction of Ph.D.s seeking but lacking specific prospects for an appointment at the time of the NAS-NRC survey. The increased proportion of new Ph.D.'s lacking prospects upon receipt of their degree does not, it should be noted, imply that large numbers of Ph.D.'s end up unemployed, for they do not, but rather it is an indicator of the increased difficulty they have in obtaining jobs in the usual academic marketplace.

Additional data (not given in the table) corroborate the picture of a significant worsening in college graduate employment opportunities, particularly among new baccalaureates. First, statistics from the Bureau of Labor Statistics survey of the graduating class of 1972 reveal that an exceptionally large number of graduates who entered the market in the 1970s were forced into jobs outside the professional and managerial areas. Over 30 percent of the male graduates of 1972, for example, and 25 percent of the female graduates of that year ended up employed in nonprofessional, nonmanagerial jobs six months after graduation. Only 45 percent of the male bachelors recipients and 65 percent of the female graduates obtained professional jobs compared to 71 percent and 81 percent of roughly similar graduates in the class

Table 2 Measures of the Employment Opportunities of College Workers 1969-1975

	1969	1975	Δ in Percentage Points
1. Proportion of College Workers in Professional Jobs Males	61	54	-7
2. Proportion of College Workers in Professional Jobs Females	81	70	-11
3. Proportion of New Education Graduates Obtaining Teaching Jobs	74	48	-26
4. Proportion of New Ph.D.'s Seeking Appoints But Lacking Specific Prospects	6	26[a]	20

Source:

Line 1, U.S. Department of Labor, Educational Attainment of Workers March 1969 (Special Labor Force Report 125, Table I, p. A-28) and unnumbered preliminary report for March 1973, Table 5, p. 6.

Line 2, National Education Association as reprinted in Scientific Manpower Commission, Manpower Comments. July-Aug. 1776 Vol. 13, No. 6, p. 7.

Line 3, R. Freeman, The Overeducated American, Academic Press, 1976, Table 8, p. 91.

[a]1974

of 1958 (Freeman, 1976a, p. 20). Second, many graduates of the 1970s reported that they were employed in positions outside their fields of study. Twenty-four percent of employed male graduates and 22 percent of employed female graduates in the class of 1972 ended up in areas "not at all related" to their college studies, compared to about 10 percent of the starting graduates a decade or so earlier (class of 1958). The absence of jobs rather than the existence of better opportunities in other fields was cited by the 1970s graduates as the principal reason for working in jobs not directly related to fields of study--the opposite reason to that given by the class of 1958. One-third of male graduates and nearly two-thirds of female graduates working outside their field could not find a job in their field in the early 1970s, compared to 10 percent and 13 percent in the early 1960s; less than one in five men and virtually no women moved to new areas because of better opportunities in 1971, in contrast to about three in ten in the 1958 graduating class.[3] Third, while the rate of unemployment of college graduates is always much below that of other workers, graduates, particularly new entrants have had an increasingly difficult time obtaining jobs in the seventies. In October 1972, the rate of unemployment for graduates of the class of 1972, for example, stood at 9.3 percent, far in excess of the national average for workers (5.6 percent) and above that for high school graduates of about the same age (7.7 percent). Persons who had majored in the humanities or social sciences faced even higher unemployment rates of 15.4 percent and 16.0 percent, respectively. Although less dramatic, there was an analogous worsening in the rate of unemployment among all college graduates and among those employed in professional and managerial jobs. In 1968, 0.7 percent of college graduates and 1.2 percent of professionals

lacked employment compared to an economy-wide average of 3.1 percent. Between 1968 and 1974, the rates for college graduates and professionals rose to 2.3 percent while the overall rate increased less rapidly to 5.6 percent. When the average unemployment reached 8.5 percent in 1975, however the rate for graduates rose to 3.6% while that for professionals went to 3.2%. Young male college workers had an unemployment rate of 9.8 percent.[4]

The decline in the income advantage of college workers in the 1970s was accompanied by continued rises in the direct cost of education, with the necessary consequence that the rate of return to investment in college fell. Table 3 compares costs of training with the income rewards accruing to young (25 to 34 year old) male graduates. For historic perspective, the table covers a longer period than tables 1 and 2; for comparability of incomes over time, it deals with the income of all workers rather than year-round full-time workers. Lines 1 and 2 show sizeable increases in the real cost of college in the 1970s, with tuition and fees in public and private colleges increasing by 16% and total cost per pupil increasing by 11% in the 1969-74 period. Line 3 turns to the benefit side of the picture. It records the difference between the income of college and high school graduates. Consistent with the picture in table 1, the data reveal a marked drop in the absolute real differential between young male college and high school workers in the period. Whereas in 1969 25-34 year old college men earned $2408 more than similarly aged high school graduates, in 1974, their advantage was just $1083, a striking 55 percent decline. Line 4 compares the pattern of change in the benefits and costs in terms of ratios of the costs of college to the earnings differences. In 1969, tuition and fees at public institutions averaged just 12 percent, and at private institutions, 58 percent, of the income differential between 25-34

year old college and high school men. In 1974, as a result of 16 and 11 percent increases in tuition and fees at the two types of institutions, respectively, and the decline in the income differential, the ratios of private direct costs to the differences rose to 31 percent and 143 percent. Similarly, total direct cost per pupil jumped from 10 percent above the differential in incomes among 25-34 year olds to nearly three times as large.

By carrying the comparisons of incomes and costs back to 1949, table 3 provides some insight into the extent to which some of the dramatic symptoms of change in the 1970s result from comparisons with the booming market for graduates in the 1960s. The figures for earlier years show that the economic position of graduates was in fact particularly strong in the 1950s and 1960s, with the earnings differential peaking in real terms in 1969, but that the decline in the advantage of college and the rise in the ratio of costs to the advantage in the 1970s still produced a market situation much worse than in previous decades.

Finally, the way in which these changes affect rates of return depend on assumptions about future income profiles. If the graduates of the 1970s are assumed to recoup some of the relative income losses of the period, the rate of return to the college investment will fall less than if their position remains relatively low. Estimates of changes in rates of return under diverse assumptions about future income profiles suggest declines on the order of 2-4 percentage points (Freeman, 1977) which is quite large for this traditionally stable statistic. Whatever the precise estimate, the evidence shows clearly that the downturn in the college job market had substantial adverse effects on the income, employment and return to the college investment, with the young graduates of the period bearing the brunt of the change in the market.

Table 3 Changes in the Cost of College and in the Ratio of Costs to the Benefits of College, 1949-1974

(all $ in 1967 constant $)

	1949	1961	1969	1974	%Δ 1969-1974
1. Tuition and fees to the individual					
a. public	153	248	295	341	15.6
b. private	655	1011	1397	1550	11.0
2. Total cost/pupil	1182	1995[a]	2686	2988	11.2
3. Earnings of men 25-34 years old					
a. college graduate	5773	8334	9815	8350	-14.9
b. high school	4546	5979	7407	7267	-1.9
c. difference	1227	2365	2408	1083	-55.0
4. Ratio of Costs to Earnings Differences					
public tuition and fees (line 1a/line c)	.12	.10	.12	.31	158.
private tuition and fees (line 1b/line 3c)	.53	.43	.58	1.43	147.
total cost/(line 2/ line 3c)	.96	.84	1.12	2.76	146.

Source:

line 1, 1969, 1974 from U.S. Office of Education, Projections of Educational Statistics to 1984-85, 1975 ed., p. 106.
1961 from U.S. Office of Education, Projections of Educational Statistics to 1978-79, 1969 ed., Table 50, p. 107.
1949 from National Science Foundation, Statistical Handbook of Science and Education, (NSF 60-13), Figure 48, p. 51.

line 2, U.S. Office of Education, Digest of Educational Statistics, 1975, table 92, obtained by dividing current fund expenditures by respondent degree credit enrollment.

Deflator is from U.S. Department of Labor, Employment and Training Report of the President 1976, Table G-6, p. 362.

line 3, U.S. Bureau of the Census, Current Population Reports Consumer Income Series P-60 No. 92, Table 1 with ungrouped data adjusted by ratio of ungrouped means in 1967. No. 75, Tables 47, 58, and 101.

U.S. Dept. of Commerce, Trends in the Income of Families and Persons in the U.S., technical paper 8, Table 3

1949 earnings from H. P. Miller, "Annual and Lifetime Income in Relation to Education: 1939-1959, AER, (Dec. 1960) Table 1.

Proposition 2: Levelling or Decline in Enrollments

The response of young persons to the change in the market for graduates provides important evidence on the validity and significance of the decline shown in the employment and income data. Figure 1 presents data on the enrollment behavior of young persons in the changing college market. It depicts the proportion of 18 to 19 year olds enrolled in college from 1951 to 1974 and the percentage from specific high school graduating classes enrolled as freshmen in the following year. What stands out in the data is the sudden sharp fall in the relative number of male college students, which began in 1969 (1968 in the high school graduate data), when the labor market turned down after more than a decade of substantial increases. In 1969, 44.0 percent of 18 to 19 year old male civilians enrolled in college, and 60 percent of new high school male graduates elected to become freshmen (down from 63 percent in 1968). Five years later, just 33.4 percent of 18 to 19 year old males and 49 percent of male high school graduates went on to college-remarkable declines of 10.6 and 11 percentage points, respectively. The decline in enrollment patterns was arrested in 1975, possibly as a result of the worsened employment and income prospects facing high scholl graduates due to the recession, but without coming close to restoring pre-1970s enrollment patterns.

The extent of the change in the proportion of young men going on to college depends, it should be noted, on the way in which draftees are treated in the data. Because a relatively large number of young men were drafted into the armed forces in 1969, if the denominator in the propensities is changed from civilian men to all men, the rate of

Figure 1: Proportion of Young Men and Women Enrolled in College 1951-1975

Source: U.S. Bureau of the Census, "School Enrollment," Current Population Reports, Series P-20; various editions, 1950-1975; U.S. Bureau of Labor Statistics, Employment of High School Graduates and Dropouts, Special Labor Force Report, No. 168 (Oct. 1973) p. 50; Monthly Labor Review (Aug. 1974), p. 35; with 1975 update.

enrollment in 1969 is reduced much more than in later years. Hence the drop in the propensity is much attenuated. Whether civilian men or all men is the appropriate base for comparison is debatable. On the one hand, it can be argued that those drafted into the armed forces could not choose to go to college during Vietnam and thus cannot be treated in the same manner as civilian men. If, as seems reasonable, the draftees had some probability to go to college, in the absence of the draft, the ratio of enrollees to the total would understate the propensity during the draft period. On the other hand, it is likely that draftees had a smaller tendency to go than other young persons, so that the ratio of enrollees to civilian men probably overstates the propensity. While there is thus some issue about the extent of the turnaround in male enrollment patterns, the basic fact is that for the first time in recent history, the upward trend in college attainment among young men came to an end: men in the high school classes of 1974 and 1975 were likely to obtain no more and, to some extent at least, less additional formal schooling than those in the class of 1968.

Among women, figure 1 shows a somewhat different story. Here, enrollment rates level off in the 1970s but do not decline. In 1969 34.4 percent of women aged 18-19 enrolled in college; in 1974 33 percent and in 1975 36.7 percent. The proportion of female high school graduates going on to college remained roughly stable over the same period (47 percent in 1969, 46 percent in 1974 and 49 percent in 1975). As a result of the decreasing proportion of young men going on to college and the stability in the proportion of young women, the female share of entering students rose sharply in the period. In 1975 women constituted 52 percent of 18-19

year olds in college compared to 46 percent of 18-19 year olds in 1969.

Was the decline in the proportion of young persons going to college concentrated among persons from less advantaged backgrounds or did it occur more evenly among those from high as well as low or middle income families? Surprisingly, perhaps, U.S. Bureau of Census evidence suggests that the depressed market was weakened in all social strata. The proportion attending college full-time fell by 20 percent among those from families with incomes below $3,000; by 33 percent among those with incomes from $7,500 to $9,995, and by 20 percent, among those from homes with incomes of $15,000 or more. The fall in enrollments from the middle and upper classes represents a major change in the traditional pattern of intergenerational mobility: for the first time, large numbers of young persons appeared likely to obtain less schooling and potentially lower occupational status than their parents (Freeman, 1976, Chapter 3).

Among persons beyond the normal college age groups, those aged 30 to 34 or 35+, a very different pattern of enrollments emerges: significant increases rather than decreases in enrollment propensities. In 1969, 536,000 persons aged 30 to 34 enrolled in college; in 1974, 720,000 enrolled. Only 5.1 percent of men in that age bracket attended in the former year compared to 6.5 percent in the latter. As for those 35 and over, between 1972 (when data was first obtained for this age group) and 1974, enrollments jumped by 30 percent to about 1 million. The majority of these persons attended part-time, as might be expected given their likely family responsibilities, and enrolled in vocational programs designed to help them in their careers.[5]

There are several factors behind the movement of older persons going or returning to college: increased recognition of the need for

retraining in fields of rapid technological progress, which gives companies an incentive to provide special programs and funds for occupational education; declines in the number of children per family, which frees time for other activities; special recruitment efforts by colleges hard-pressed for students; other, possibly secular, changes in values toward education; and the short hours and increased unemployment of the recession years 1974-75, which make it less costly to switch from work to school activities. To the extent that long run rather than cyclical factors underlie the observed changes, the rise in adult enrollments may portend a major change in the age distribution of college students, particularly in the 1980s, when the number of the young will decline for demographic reasons.

The upward trend in the enrollment of older persons in college notwithstanding, the proportion of persons going on to graduate study dropped noticeably in the 1970s. Table 4 presents two sets of figures on graduate enrollments--Office of Education data, based on surveys of institutions of higher education, and Bureau of the Census data, which are obtained from the Current Population Survey of individuals. Lines 1 and 2 record the absolute number enrolled in graduate programs in 1969, when the market was still strong and in 1975, after several years of downturn. Line 3 gives estimates of the relevant population which could be expected to go on to graduate studies: college graduates aged 22 to 29 while lines 4 and 5 present the estimated "propensity to enroll for graduate work," defined as the ratio of the figures in lines 1 and 2 to those in line 3. According to statistics, the absolute numbers pursuing graduate work increased moderately from 1969 to 1975, but much less rapidly than did the relevant population of eligibles. Thus, the

Table 4: Changes in the Proportion of Persons Going for Graduate Education

	1969	1975	%Δ
1. Number enrolled for graduate work (O.E.)	955	1232[a]	29.0
2. Number enrolled for 5 or more years (Census)	1138	1589	39.6
3. Number of 22-29 year olds with 4 years of college	2281	3932	72.4
4. Number Enrolled (OE)/22-29 year old college graduates	41.9	31.3	-25.3
5. Number Enrolled (Census)/22-29 year old college graduates	49.9	40.4	-19.0

Source: line 1, U.S. Department of H.E.W., Projections of Education Statistics to 1984-5 Table 17, p. 34.
line 2, 1969, U.S. Bureau of the Census, Current Population Reports Series P-20, No. 294. School Enrollment, table 3 p. 86.
line 3, U.S. Bureau of the Census, Current Population Reports, Series P-20 No. 194, Educational Attainment, table 1, p-9 and No. 295, table 1, p. 9

[a]1974

propensity to enroll for graduate work fell. With the Office of Education total enrollment figures, the propensity is seen to fall by 25 percent; with the CPS data by 19 percent.

Data on number of Ph.D.'s granted, from the National Academy of Sciences, provide confirmatory evidence of the slowdown in graduate education. In 1972 the NAS-NRC reported 27,700 Ph.D.'s granted; in 1975 25,700. In professional schools, by contrast, applicants and enrollments tended to increase through the mid-1970s, in part it may be surmised as a result of the relatively better market prospects facing young lawyers, doctors, or MBA's than young masters or doctorate recipients. From 1968 to 1971 prospective applicants to law school, defined as persons taking the legal Scholastic Achievement Test, jumped; applications to medical school increased by 116 percent; from 1965 to 1975, the MBA share of masters degrees by 79 percent. Thereafter, applicants or enrollments appear to have levelled off. [6]

In sum, the evidence on enrollments, applications and degrees lends considerable support to the proposition that there was a substantial change in the college job market which engendered significant responses on the part of young persons.

Group Differences: Proposition 3

That black and female graduates fared differently than white male college workers in the period under study is evinced in income, employment, and enrollment statistics.

Perhaps most importantly, black college graduates, who obtained substantial gains relative to whites following the initiation of national equal employment opportunity efforts in the mid 1960s, continued to advance in the job market. From 1969 to 1974 the income of black women with 4 or more years of college increased by 33 percent compared to a 25 percent increase for white women. In 1974, black female graduates actually earned 25 percent more than white female graduates. While the black advantage is due in large measure to the greater attachment to the job market of black than white women, the fact is that even adjusted for attachment, black women workers do not appear to have suffered any discriminatory disadvantage relative to whites in the college market in the 1970s.[7] Among male graduates, a similar picture of continued progress relative to whites is shown in various data:

—The income of black male college graduates, in toto, increased somewhat more rapidly than that of whites from 1969 to 1974 despite the recession. In 1969 black men averaged $8567; in 1974, $10954, a 28 percent increase, while whites averaged $12437 in the former and $15419 in the latter year, for an increase of 24 percent.[8]

—Young or starting black college men, who attained rough salary parity with comparable white college men in the late 1960s appear to have maintained their relative position in the market downturn. In 1973, 25-29 year old

black male college graduates actually earned a bit more than comparable whites.[9] By contrast, black high school graduates still obtained much less than white high school graduates. While estimates of the rate of return to black college investments are difficult to make as there is considerable uncertainty about whether or not parity among the young will be maintained, even pessimistic calculations suggest higher rates than for whites in the 1970s (Freeman, 1977b). Note, however, that the high return to black college men reflects the poor income prospects of black high school graduates more than the "great" prospects of black college men.

—Between 1970 and 1975 the proportion of blacks in major professions rose, in some cases at even faster rates than in the preceding market boom. For example, the proportion of accountants who were nonwhite increased from 3.9%(1970) to 7.4% (1975); the proportion of engineers who were nonwhite grew from 2.9% (1970) to 4.8% (1975); the proportion of black personnel and labor relations experts rose from 5.7% (1970) to 8.6 % (1975). Of particular significance, the fraction of black male graduates obtaining jobs as managers rose from 11.2% in 1969 to 16.1% in 1975 while the fraction of white male graduates working as managers remained roughly unchanged.[10] The gap in the job distribution of black and white college men, while not eliminated, was significantly reduced through the mid 1970s.

—Blacks employed as faculty or having Ph.D.'s either attained or maintained rough income equality with similarly qualified white workers and began to obtain jobs in primarily white college and universities in the period. Several different studies, ranging from analyses of individual institutions to analyses of surveys of the overall college

teacher work force, show blacks and whites earning similar pay, given similar degrees, fields of teaching, and academic productivity in terms of articles published. The American Council on Education-Carnegie Commission national surveys reveal a marked increase in the proportion of black faculty working outside the traditionally primarily black colleges of the south. In 1969, 29% of black male college professors worked in primarily white colleges and universities; in 1973, 49%. As for all Ph.D.'s, data on salaries from the National Science Foundation show black doctorates with earnings of $21,200 in 1973 compared to $21,000 for white doctorates. Among faculty and doctorates, all black male graduates, not just those beginning their careers, had achieved economic parity with whites by the mid 1970s.[11]

-Consistent with the picture of high rates of return to black college investments, evidence on enrollments shows that young blacks, who first began attending college in large numbers in the sixties continued to increase their representation in higher education in the 1970s, substantially narrowing the black/white gap in enrollments. In 1969, 236,000 black men were in college; in 1975, there were 442,000, bringing the black share of male students from 5% to 8%. As a percentage of 18 to 19 year-olds, black male enrollments increased slightly over the same period, from .23 to .25, despite the overall drop in the proportion of young men in college. At the graduate level, the number of blacks enrolled also increased relative to the number of whites so that by the mid 1970s, blacks came to constitute a significant proportion of students in medical and law schools, and a growing but still modest proportion in business

schools. While some concern was expressed about the direction of change in black representation in graduate education, especially medical schools, in the mid 1970s, there was no indication that the extraordinary advances of the late 1960s and early 1970s would be destroyed by depressed market conditions.[12]

The effect of the downturn in the college market on college-trained women is less clear. By some measures, the position of graduate women deteriorated significantly; by others it did not. Income data show, for example, a loss in the position of college trained women relative to high school women, with the ratio of incomes of full-time year-round employees dropping from 1.40 in 1969 to 1.35 in 1974. There is, however, considerable fluctuation in the income ratios from year to year, making inferences risky. More interestingly, perhaps, women college graduates appear to have done somewhat better than male college graduates in the period of decline. Between 1969 and 1974 the income of women with 4 years of college employed full-time and year-round increased by 49% compared to a gain of 33% for men. In industry, starting rates for female graduates increased more rapidly than those for male graduates, bringing women to rough parity or a slight premium over comparable men. For example, one placement survey reported that from 1969 to 1975 the salaries of beginning women in accounting rose by 42% compared to 34% for beginning men; that the starting pay of women with liberal arts majors increased by 36% compared to 18% for men; and that women with bachelors in business administration enjoyed gains of 42% compared to 22% increases for male graduates.[13]

College-trained women also appear to have made some gains relative to men in the occupational structure. As table 5 shows, the proportion of workers who were women rose in many important college-level occupations

Table 5 The Proportion of Workers in High-level Occupations Who Are Female, 1970-1975

	1970	1975
Accountants	26.2	24.6
Architects	3.6	4.3
Engineers	0.6	1.1
Lawyers	4.9	7.1
Doctors	9.3	11.3
Editors and Reporters	40.6	44.6
Teachers, College	28.6	31.1
Managers	16.6	19.4
Salaried Managers	16.1	19.3

Source: 1970 data from U.S. Bureau of Census, Census of Population 1970, Detailed Characteristics U.S. Summary PC(1)-D1 table a1, pp. 718-719. Data for experienced work force, 1974 U.S. Bureau of Labor Statistics, Employment and Earnings, January 1976. Vol. 22, No. 7, table 2, p. 11.

and fell in only one in the 1970-75 period. For whatever reason, women were making noticeable movement into primarily male professions and also into managerial jobs. On the other hand, however, the job market in teaching, historically the major occupation for female graduates, deteriorated exceptionally sharply in the period, with the consequence that many female prospective teachers had an exceptionally hard time getting jobs commensurate with their education. Overall, the proportion of women graduates employed as teachers dropped from 50.4% in 1969 to 41.9% in 1973. The proportion employed as professionals also fell, by 11.3 percentage points, while the proportion obtaining jobs in non-college level occupations, for instance as clerical workers, rose from 15 % to 23 %. Whether the new opportunities in primarily male fields are increasing or will increase by enough to counterbalance the decline in teaching opportunities is by no means clear at this time.[14]

The apparently greater decline in the relative economic position of college-trained men than women in the 1970s has had an important impact on the route by which women benefit economically from college-going. Historically, the main economic reward to women from going to college has been an increased probability of marrying a male college graduate and thus in sharing the return to the male investment. In 1970s, for example, 63% of female college graduates married college degree men compared to 10% of female high school graduates. Estimates of the income gain to women from 4 years of college suggest that gains through marriage were roughly 2 times as large as those from working. Because of the drop in the relative income of young college men, this traditional pattern appears to have been greatly altered in the new market. The husbands of 25 to 29 year old female college graduates earned $800 more than the

husbands of 25 to 29 year old female high school graduates in 1973 while the college women themselves obtained more than $2,000 in income above that of high school graduates from the job market. The pecuniary reward to female college-going from work has become more important than that from marriage.[15]

Finally, enrollment data provide additional evidence of the differential impact of the downturn in the college market on women than men. As noted earlier, the enrollment of women into college did not decline in the 1970s but rather stabilized as a fraction of the population of college age. At the graduate level, the female share of masters recipients rose from less than a third to over 40%. From the early 1960s to the 1970s, the share of Ph.D.'s increased from 10% to 20%; the proportion of women enrolled as first-year medical students rose to 22%; and the female share of law students to one-third. In 1960, 3% of architecture graduates were women; in 1972, 12%, and so forth. There was a marked shift in the career plans of college women from teaching into traditionally male occupations.[16]

In sum, the data on incomes, employment, enrollments and degrees reveal different changes in the market opportunities and in the behavior of college-trained women and blacks than in the behavior and opportunities for their white male peers. While all graduates suffered from the drop in the market, women and blacks were less adversely affected and thus gained vis à vis white male graduates.

Field Differences: Proposition 4

One of the basic features of the booming job market for college graduates of the 1950s and 1960s was the ascendency of education and research-oriented occupations relative to business occupations and traditional independent professions. Space and military R&D spending and national investment in education at all levels brought about significant increases in salaries and employment opportunities for school teachers, Ph.D.'s, and research personnel which attracted many into the academic fields. The downturn in the college market in the 1970s substantially reversed this trend. In the falling market, the economic situation of academic and research professions was exceptionally distressed, bringing to an end a "golden age" of rising salaries and job opportunities, while business, law, medicine and engineering suffered more modest declines.

Starting salaries, one of the best indicators of change in the market, show clearly the differential pattern of change among fields in the downturn. As table 6 documents, there was a significant variation in the rate of decline in the real starting salaries of workers from 1969 to 1974. At the bachelors level humanities and social science majors experienced the sharpest losses, a fall in real starting pay of over 25 percent, followed by physical scientists and mathematicians, while accountants and engineers had more modest rates of decline. Within the same field, the salary of masters and doctorate personnel declined more rapidly than that of bachelors graduates, save for MBA's, where the reverse was true. The especially large drop in the real pay of Ph.D. and MA or MS workers significantly cut their premium over bachelor's graduates and thus

Table 6: Compound Annual Changes in the Starting Salaries of Bachelor's Graduates, 1961-69 and 1969-74

Group	1961-69 Period of Relative Market Boom		1969-74 Period of Relative Market Bust	
	Annual Percent Change in Salaries	Annual % change minus change in cons. price index	Annual Percent Change in Salaries	Annual % change minus change in cons. price index
Accountant	6.0	3.4	4.0	-2.2
Business-general	5.7	3.1	2.4	-3.8
Humanities & Social Science	5.3	2.7	1.1	-5.1
Aeronautic Engineering	4.3	2.2	3.1	-3.1
Chemical "	5.8	3.2	3.8	-2.4
Civil	5.7	3.1	3.9	-2.3
Electrical "	5.1	2.5	3.2	-3.0
Mechanical "	5.3	2.7	3.5	-2.7
Industrial "	4.7	2.1	3.3	-2.9
Physical Sciences & Math	4.8	2.2	2.1	-4.1
Changes in annual earnings of year-round full-time workers	4.7	2.1	6.6[a]	+0.4

Sources: College Placement Council, Men's Salary Survey, Bethlehem, Pennsylvania (1962-74), with preliminary data for 1974.
U.S. Dep't. of Labor, Manpower Report of the President and Monthly Labor Review (May, 1974).
U.S. Dep't. of Commerce, Survey of Current Business (July editions).

[a] 1974 estimated by percentage change in average hourly earnings of all private production workers from March '73 to March '74.

lowered the rate of return to postgraduate training. In 1965 a Ph.D. electrical engineer earned 82 percent and a MS engineer 22 percent more than a B.S. engineer in the specialty. In 1975,the advantage to the Ph.D. or M.S. had fallen to 42 percent and 8 percent, respectively.

Information on the types of jobs obtained and difficulties in finding positions by field of study tell a similar story. According to the surveys of the National Education Association, elementary and high school teaching was one of the most depressed fields, with the proportion of new education graduates obtaining teaching jobs dropping from 74 percent in 1962 to 48 percent in 1974. Similarly, the National Academy of Science-National Research Council's survey of new Ph.D.'s shows that new Ph.D.'s seeking appointments in a discipline but having no specific job prospects ranged from 36 percent in English to 12% in economics in 1974, indicative of substantial differences in the difficulty of obtaining jobs. American Association of University Professors data reveal a sizeable drop in the real income of college professors. Measured in 1967 dollars, the average faculty member earned $16,980 in 1976 compared to $17,549 in 1969. At the other end of the spectrum, the economic position of business oriented professions, such as accounting and MBA management and of medicine and law improved relative to that of the college graduate average. In the sciences bachelor's degree engineering experienced a "cobweb" upswing while biomedical sciences, whose research support was not reduced during the period, had only a modest downturn. With some exception, however, even in fields least affected by the market decline, the income of college graduates dropped relative to that of less educated workers. As the last line in table 6 shows, the pay of workers, on average, held roughly steady,

in terms of pre-tax real earnings, in contrast to the decline in the real income of college-trained personnel.[17]

The differential change in the income and employment conditions in the various college-level occupations appears to have generated a significant supply response from young persons in the process of choosing their careers. As would be expected of economically responsive decision-makers, students shifted from fields facing the worst market conditions to those with relatively better prospects.

—In the hard hit education area, the number of graduates in school teaching fell by nearly 10 percent in the 1972-1975 period while the proportion of freshmen planning on education careers declined precipitously, particularly among women for whom teaching had traditionally been the graduate career.[18]

—In the physical sciences first year graduate enrollments dropped relative to the number of bachelor's graduates; from 1968 to 1973, the number fell absolutely as well, stabilizing or rising slightly thereafter. Between 1961 and 1971 the number of first-year graduate students in physics dropped by one-third with the consequence that the number of Ph.D.'s in the area fell from its peak several years earlier (Freeman, 1975c).

-In fields with stronger job markets, biosciences, agriculture, and business-oriented specialties, by contrast, enrollments increased. The number of students seeking MBA's, for example, grew greatly from 1970 to 1974, while, according to the National Association of State Universities and Land Grant Colleges, the number in land grant schools rose by 52 percent from 1969 to 1974. In the life sciences, first year graduate enrollments continued to increase in the 1970s, in sharp contrast to the decline

in enrollments in the natural sciences.[19]

—Perhaps most impressive in terms of the differential pattern of change among fields is the experience of engineering, which throughout the late 1960s and early 1970s had substantially declining enrollments. From 1973 to 1975, first year enrollments in B.S. engineering, which had in 1973 plummetted to its lowest figure since 1949, despite the expansion of higher education, rose by 23,000 in the following two years, in accord with the cobweb dynamics that seem to characterize that field.[21]

All told, the evidence on incomes and employment by field and on the pattern of student enrollments provide strong support for the proposition that the overall decline in the job market for college workers had very different effects on different disciplines.

Impacts on the Less Educated: Proposition 5

The downturn in the market for college graduates has had a mixed effect on the economic position and options facing high school graduates and others who choose not to enroll for higher education. On the one hand, by definition, the decline in the ratio of the incomes of college to high school workers implies an increase in the ratio of high school to college incomes, thereby improving the relative income of lower paid, less educated persons. If, in addition, college trained and less educated workers are substitutes in production, the increased supply of college graduates in the 1970s may also have raised the real income of the less educated. Under normal marginal productivity assumptions, the growth of one factor tends to raise the marginal product and thus real income of other factors.

At the same time, however, the large supply of college graduates appears to have substantially reduced the opportunities for less educated workers to attain white collar positions. In the 1970s employers found it cheaper and easier to hire college graduates for sales, clerical, and lower-level management jobs than in the past and substituted college for noncollege manpower in these professions, with adverse consequences for the job structure of the less educated.

Table 7 examines the 1970s decline in the white collar job prospects of high school men and the shift from high school to college workers in these occupations. Columns 1-2 record the proportion of high school men employed in the 4 one-digit white collar occupations in 1969 and 1975; column 3 gives the change in the proportions. In each of the areas, there is a drop in the frequency or probability that high school men would be employed, suggesting a worsening in the white collar

opportunities for high school men. A similar pattern is shown in the ratio of high school to college men in columns 4-6. From 1969 to 1975, when the ratio of high school to college graduates in total decreased by 20 %, the ratios within white collar occupations fell more sharply, indicating a particularly large shift toward college graduates there. Econometric analysis shows that these changes can be attributed to the "excess supply" of college workers in the period and suggest further that the elasticity of substitution between high school with college workers in managerial, clerical, and sales work is sufficiently high that continued increases in the availability of college graduates and decreases in their wages will maintain this pattern into the future (Freeman, 1975d). This is not to say that alternatives to the college route to white-collar jobs do not exist, but merely that the surplus of graduates is likely to make it more difficult for nongraduates to compete for those jobs than in the past.

Table 7: Proportions of Male High School Graduates Employed and the Ratio of High School to College Workers in White Collar Occupations, 1969-1975

	Proportion of High School Men Employed [a]			Ratio of High School Men to College Men Employed in Each Occupation		
	1969	1975	%Δ	1969	1975	%Δ
Professional	7.3	5.7	-21.9	.29	.20	-31.0
Managers	15.0	13.5	-10.1	1.64	1.12	-31.7
Sales	6.2	5.8	-6.5	2.17	1.37	-36.9
Clerical	8.1	8.0	-1.2	6.03	3.56	-40.9

Source: U.S. Bureau of Labor Statistics, Sepcial Labor Force Reports 125, P.A-28; 186, p. A-19

[a]Ratio of high school men in each occupation to the total number of high school men.

II Evaluation of the Market Turnaround

> Life is a Mirror and will reflect back to the thinker what one thinks into it.
> Salada Tea

What importance should be attached to the observed downturn in the market for college graduates of the 1970s? Does the decline in the relative income and occupational position of new graduates represent a temporary aberration or is it the result of more fundamental supply and demand forces? Is the relatively depressed condition of the graduate market likely to be maintained in the future? Will it worsen further or will the booming market of the 1960s be restored shortly? Why did the market undergo such a sharp downturn in the 1970s? What lessons can be learned from the experience?

To answer these questions it is necessary to examine the operation of the job market for educated workers--to understand the way in which individuals, enterprises, and institutions respond to economic developments and the way in which their behavior interacts in the marketplace. In this section I sketch out what I believe to be the critical elements in the college job market and use the resultant analytic framework to explain the sharp deterioration in the supply/demand balance of the 1970s and to peer, albeit cautiously, into the future. As there is, not surprisingly, some disagreement about the importance of various factors in the turnaround and considerable uncertainty about future possibilities, attention is also given to alternative views, so as to present a reasonably balanced picture of the phenomenon under study. Formal statistical tests of the analysis

are given in the scholarly papers and books referred to in the relevant footnotes.

1. Responsive supply behavior on the part of young students. Contrary to the traditional view of career decision-making, in which noneconomic forces predominate in the decision process, the evidence examined in this project and in other economic studies shows the educational and occupational decisions of young persons to be quite sensitive to the state of the market. Three basic types of evidence support the "responsive supply" hypothesis. First are econometric studies relating the number of students enrolled or graduating in various fields to salaries in those disciplines and to salaries in alternative professions. While precise estimates depend on the specification of models, years covered, and measures of variables, the general finding is that salaries have a significant and large impact on supply decisions. Table 8 summarizes some of the relevant estimates of elasticities for particular fields and for all freshmen in college. Column 1 gives estimates of the "short run" effect of salaries, where short run relates to the response in a given year. Column 2 gives estimated "long run" elasticies, generally calculated from a partial adjustment model. Because the models and parameter estimates are crude and subject to change given more detailed specification or new observations, the calculations are to be viewed as providing orders of magnitude of the behavioral relations. The elasticities for specific fields range from 1 to 2 in the short run and from 3 to 4 in the long run. The overall elasticity of students to college tends to be somewhat smaller, which is not unreasonable as the supply of potential students in particular fields is likely to

Table 8 Some Estimates of the Elasticity of Supply of Students to Diverse Fields

Field	Elasticity of Supply With Respect to Salaries	
	Short Run	Long Run
Law	0.95	2.79
Physics, B.S.	2.96	3.72
M.S.	0.93	2.82
Ph.D.	.82	4.83
MBA	0.96	3.20
Engineering, B.S.	1.82	3.25
Biology, Ph.D.	1.05	2.77
All undergraduate		
male 1	1.67	1.67
male 2	1.31	1.66

Source: Law, Freeman (1975a) table 2, line 4.

Physics, Freeman (1975b), table 4, lines 4-6

MBA, Freeman (1976a), p. 134, footnote 34

Engineering, Freeman (1976a), table 4, line 3

Biology, Freeman, unpublished report to National Academy of Sciences, summer 1975e, table 15, line 5.

Undergraduate, Freeman (1975b), table 5, line 3, 1976, p. 207.

exceed that supply of prospective students in total. As an example of the behavior underlying the statistics, consider the pattern of change in salaries and enrollments in physics. In the period surrounding Sputnik, physics salaries rose sharply due to enhanced demand for R&D personnel in the field, and the proportion of undergraduates majoring in the field and the number of graduate students doubled. In the mid 1960s through the 1970s, by contrast, salaries in the field dropped in real terms and, despite a two-fold increase in the total studentbody, junior and senior majors declined from 14,900 (1961) to 11,400 (1971) and first year graduate enrollments by a third (Freeman, 1975c).

The second type of evidence consists of the responses of students to survey questions relating to the information they have about career alternatives and to the role of economic factors in decision-making. While information flows can undoubtedly be improved, students appear to have quite reasonable knowledge about the opportunities in various specialties, often obtained from older students and their job experiences (Freeman, 1971). In surveys of freshmen by the American Council of Education about two-thirds of both male and female freshmen agree that from their perspective, "the chief benefit of college is that it increases earning power," which is consistent with considerable sensitivity to economic incentives.[20]

A third body of evidence consists of the observed relation between enrollments in fields and non wage indicators of market conditions, such as expenditures in the area, numbers of recent graduates, problems of obtaining jobs, and the like. Because of problems and measures of income and the oft-expressed claim that persons are more attuned to "employment opportunities" than salaries per se, the fact that enrollment decisions

are highly correlated with nonprice measures of market conditions may provide what is to some more believable evidence of student responsiveness to the market than the relation between salaries and enrollments or degrees.[21]

The major consequence of responsive supply behavior for the operation of the college job market is that the fraction of young persons enrolled and the number of new graduates became critical adjustment mechanisms. With a relatively elastic supply of students to colleges and universities overall and to particular majors, changes in salaries and employment opportunities, like those experienced in the early 1970s, are translated into sizeable changes in the number of new college-trained workers.

2. Long working life. The mundane fact that people work for 40 or so years means that the vast majority of college graduates invested in their education and chose specialties years ago, making total supply relatively inelastic even when the supply of the young is highly adaptive to new circumstances. When, as in the 1970's, there are many persons in the cohorts of the young but few graduates in the retiring age brackets, total supply will grow even if the fraction of the young enrolled in college falls. As a consequence, the movement toward a long-run balance of supply and demand for graduates in the entire population will necessarily be slow, permitting disequilibrium to persist for many years. In markets with long-lived factors of production, supply-demand disequilibria are likely to be long lived also.

Two factors ameliorate the problem of adjusting the total supply of graduates to changed market conditions, such as the seventies decline. First is the fact that younger and older graduates often perform different work tasks, the former doing work directly related to their training, the

latter doing more general managerial work. Because of different activities, graduates of different ages may be only moderately substitutable for one another, leading to more or less separate labor markets. As a result, the market for new graduates may improve rapidly in the 1980s, as the era of rapid growth in numbers of graduates comes to an end. However, by the same argument, persons in the large graduating classes of the late-sixties/early seventies could suffer from a relative excess of supply over their entire lives, creating a significant intergenerational equity problem.

The second factor easing the supply adjustment problem is the possibility of occupational mobility and other forms of adaptive responses to market incentives on the part of experienced workers. Because experienced personnel can, and do, alter their supply of work to various specialties while they cannot alter their past decisions to obtain education, the supply of graduates to specific occupations is much more flexible in the short-run than the total supply of graduates.

3. Demand and Employer Behavior. The dynamic 'moving force' in the college job market is the demand for graduates, which depends on several basic economic forces, ranging from the structure of the economy, activities and technology in industry, and demography, to the possibility of substituting college graduates for other workers or machines. The structure of the economy is important because industries differ greatly in their relative employment of graduates, with for example 31% of workers in finance in 1970 having college degrees compared to 6% in automobiles. Whether college manpower intensive industries are growing rapidly as in the 1960's when aerospace, the eduction sector, and related industries enjoyed a boom, or slowly

as in the seventies is a key determinant of the state of the market. Industrial activities and technology are important because the relative employment of graduates within industries depends on what they do and how they do it. If resources are allocated to research and development or related activities which make extensive use of education, demand for graduates will be high. Similarly, demand will also be high if, for whatever reason, new technologies are relatively educated manpower-intensive (at given factor prices). Empirically, there has been considerable variation in industrial expenditures for R&D, causing sizeable shifts in demand for college graduates, especially scientific and engineering personnel. On the other hand, there has been only modest change in the intra-industrial use of educated workers within period of, say a decade or so, and even over long period, intra-industrial changes in employment of graduates appear to be dwarfed by shifts in the composition of industries.[22] Demography is important because the age structure and rate of growth of the population are critical determinants of the size of the educational sector, which is the single largest industry of employment of graduates.

Governmental activities have a major impact on demand for college graduates directly because governments are large employers of educated manpower and indirectly through purchases of goods and services from the private sector. Some purchases--R&D, space, defense, health services--result in direct changes in demand. Other purchases have less immediate but still real impacts by the input-output linkages in the economy. Analysis of federal, state, and local spending using the Input-Output table for the U.S. economy shows that dollars of public expenditures, especially at the federal level generates more demand for college-trained

workers than do dollars of private spending.

In years past the dependence of the college market on governmental activities has had a significant destabilizing effect on the economic status of graduates because federal and to a lesser extent state and local policies changed greatly in short periods of time, causing sudden turnarounds in demand. Federal R&D spending, for example, shot up greatly in the years surrounding Sputnik (October, 1957), giving a sharp spur to demand for graduate scientists and engineers, then fell (in real dollars) equally sharply in the late sixties and seventies, contributing to the market turnaround. Private R&D spending, by contrast, rose modestly throughout the entire period. Similar pronounced changes in spending are found in the health sector, in defense, and other programs. Possibly because governments tend to overact to problems due to the 'crisis mentality' of elected officials, whose time horizon is short due to the periodicity of elections, or possibly because fewer institutions are involved in the decision-making process than in private markets with many firms, governmental activities have exacerbated rather than ameliorated problems in the college market with unfortunate consequences for graduates. Governmental decisions will undoubtedly play a major role in future developments as well, for better or worse.

When, as in the seventies, the relative wages of the college trained change, the possibilities of substituting more for less educated workers became critical in market adjustment. If substitutions are relatively easy to make, only modest declines in salaries will suffice to increase employment and equilibrate supply/demand imbalances. If substitutions are difficult, enormous changes in salaries may be required for a 'surplus' of graduates to find jobs.

Empirical evidence on substitutability suggest that graduates are good but by no means perfect substitutes for other inputs. In the late sixties

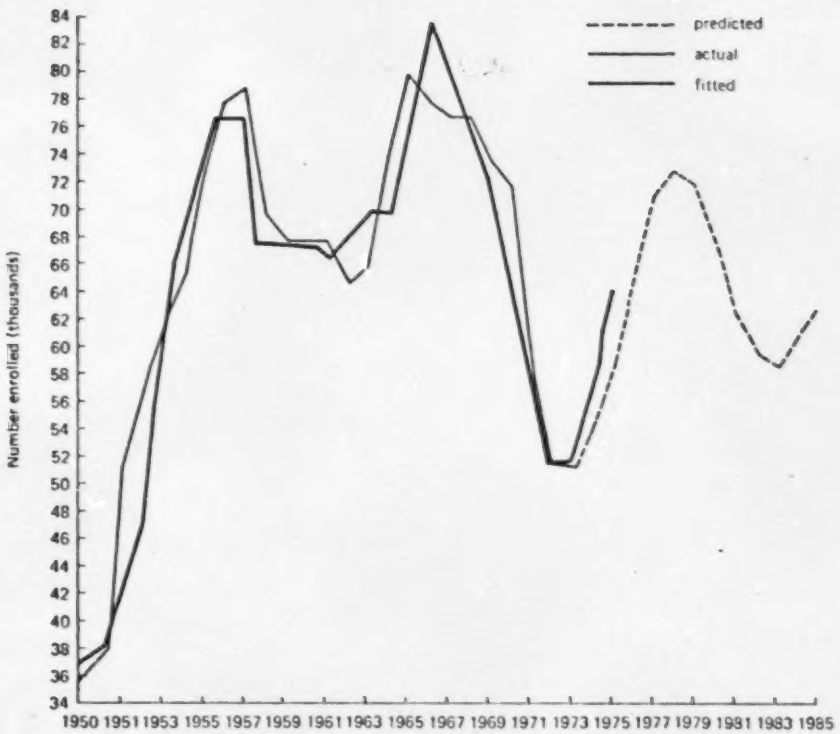
several studies (Bowles, Psacharapoulos and Hinchcliffe, and Dougherty) appeared to find surprisingly large 'elasticities of substitution', primarily from cross-country data, which suggested that only small changes in the ratio of college graduate to other salaries would be needed to increase demand greatly. More recent work, hwoever, indicates that, because of misspecification of the model, these studies overestimated the potential employment-increasing effect of declines in relative wages (Tinbergen, Layard & Fallon). Analysis of time series data supports that latter point of view, finding that increases in the number of college graduates overall and in particular fields have substantial effects on salaries. The estimates given later in table 9 of this essay, for example, suggest that a 10% increase in the ratio of college to high school men aged 25-34 reduces the relative income of graduates by about 5%, which implies an elasticity of relative demand on the order of 2. Other estimates from time series data suggest elasticities for the stock of scientists and academic faculty on the order of 1.0. Analysis of the occupations for which college and high school workers are good substitutes suggests, moreover, that much of the substitution of graduates with the less educated occurs in lower-level white collar jobs, which are of relatively low status. This implies that supply-demand imbalances of the type observed in the seventies will create underemployment problems.

4. Cobweb and accelerator dynamics. Two classic economic adjustment mechanisms govern the dynamics of the college job market.

First, because 4 or more years are required to 'produce' a college graduate, the college market tends to follow the classic 'cobweb' feedback system that has long been associated with the markets for agricultural products. Like these agricultural products, the supply of graduates is determined by market conditions several periods earlier due to the fixed time delay in educational production and is thus a lagging function of the state of the market.

Such a structure generates oscillatory ups-and-downs, with shortages changing into surpluses every 4 or 5 years. The reason for this pattern can be readily seen. If salaries and demand are strong in a specialty in, say, 1969, many students will be drawn into the field, becoming the new supply 4 or 5 years later. When they graduate in 1973, unless demand has increased commensurately, they will over supply the market, depressing salaries and employment opportunities. With the decline in incentives in 1973, relatively fewer students will enroll in the field, causing a shortage in 1977, and so forth. Of course, other factors, notably shifts in demand, will also affect the market. What is important is that there is an underlying feedback structure tending to produce cyclic movements in the supply/demand balance. Econometric models based on the cobweb hypotheses have been quite effective in 'explaining' the labor market experience of bachelor degree engineers, law graduates, masters of business administration graduates and graduates in other specialties in which there is a close one-to-one tie between education and occupation. Figure 2 displays the pattern of cobweb ups-and-downs in first-year enrollments in engineering in the post World War II period. The line giving actual first-year enrollments reveals the extreme changes in the attractiveness of engineering to students, with the number enrolling going from 50,000 (1952) to 78,000 (1957) to 64,000 (1964) to 80,000 (1965), and then dropping to about 50,000 in 1973. As a proportion of male freshmen, engineering enrollments varied in a similar manner, rising from 14% in 1950 to 23% in 1957 and then dropping to an unprecedented low of 9% in 1973. The "fitted" line gives the enrollments predicted by a simple cobweb analysis, according to which enrollments grow when demand (measured by R&D spending and output in the durable goods industries that hire many engineers) increases and fall when income opportunities in other occupations are strong or when many bachelor's engineers graduate and flood the market. While actual and predicted values are not perfectly aligned, the cobweb analysis clearly does a

Figure 2: Actual, Fitted, and Predicted B.S. First-Year Engineering Enrollments 1950-1985



Source: R. Freeman, "A Cobweb Model of the Supply and Starting Salary of New Engineers, Industrial Labor Relations Review (Jan, 1976), Table V, Figure 2. Also Center for Policy Alternatives, American Society for Engineering Education Future Directions for Engineering Education (Washington, 1975), p. 27. Predicted values assume that alternative salaries increased one-half their previous trend rate.

good job of tracking ups and downs. In the statistical computations, about 95% of the variation in first-year enrollments is explained by cobweb dynamics. It is estimated that when the number of new B.S. engineers grows by 10%, enrollments fall by 5% in the short run and by somewhat less than 10% in the long run, generating further cyclical ups and downs. Because of the lag structure of adjustment, the oscillations tend to be dampened over time unless shocked by exogenous disturbances.

Other economic measures of the engineering market also fluctuate in the cobweb pattern: starting salaries; engineering job placements by the U.S. Employment Services (Comay and Melnick); and indices of want-ads for engineers.

The other economic adjustment mechanism that plays an important role in the market for graduates is the 'accelerator' process that is traditionally viewed as governing capital goods production. In the case of the college-trained, the fact that universities hire relatively many graduates, particularly masters and doctorate recipients, means that demand depends in part on the number of students seeking academic careers. If many seek such careers, demand for faculty and salaries and employment opportunities will improve, leading to an increase in supply and further gains in demand. The situation is potentially unstable, however, because once the number of students levels off, demand for new faculty will fall rapidly, causing a decline in the number of students among those who considered academic careers, further reducing demand for faculty, and so forth. This feature of academia makes the market for university faculty and graduate studies exceptionally vulnerable to changes in the growth of enrollments. Academia stands on a

revolving ball in which you have to run to stay in place and when you stop, you fall.

Why the booming sixties bust

Given the view of the functioning of the college job market sketched out above, what caused the seventies depression? What will the future bring? The question of why the college manpower market collapsed so suddenly at the outset of the 1970's can be turned around: why was the market so strong in preceding decades, despite continual growth of supply?

Two factors appear to answer both of these questions and explain the state of the market over the entire post-world war II period. On the demand side, the relative position of the highly educated was maintained in the 1950's and 1960's by large increases in demand due to changes in the industrial mix of jobs, the growth of R&D, and the extraordinary expansion of the education sector. In the seventies, all of these forces, which provided a significant upward push to the market, weakened or actually declined relative to the overall state of the economy.

The quantitative dimensions of the slackened demand are shown in table 9 and figure 3. The table contrasts the growth of employment in industries that hire relatively many college graduates to the growth in those which employ few. It covers both the booming sixties and the seventies. Among the industries with many graduates are: federal public administration, where 1 in 6 male graduate works for the national bureaucracy; professional services, ranging from law to welfare; finance, insurance, and realty; and certain manufacturing industries - ordnance, chemicals, petroleum, instruments, elec-

tronic computing, aircraft, electrical machinery--and, of course education, which accounts for over half of female college graduates and one-tenth of male graduates. Industries which hire very few college graduates range from transportation, communication, the rest of manufacturing to agriculture.

There are two important findings in the table. First and most clearly is the striking change in the differential growth between the college manpower intensive and other sectors between the two periods. From 1960 to 1969, employment grew more than twice as rapidly in the college than in other industries, a differential rate per annum of 2.4%. From 1969 to 1974, the sectoral growth rates became much more similar - as employment in college-intensive industries increased less rapidly than in the previous decade. In the seventies the differential in growth was just 0.8%. Second, the industry data in the table (and more disaggregate figures not reported there) show clearly that employment in a wide variety of college-manpower intensive sectors slackened off in the seventies bust. The rate of change in employment in college-intensive manufacturing, for example, which accounts for about one in nine male graduates, dropped from 3.6% per annum to -1.2% over the period while that in federal public administration fell from 2.0% to 0%. This means that the developments in the period cannot - as some have asserted - be traced solely to changes in the size of the education sector and to demographic shifts in the number of persons of school age. The rate of growth of demand for college workers decelerated relative to that for the less educated in the seventies as a result of a more general shift in the industrial composition of employment from college intensive to other parts of the economy.

Table 9 Compound Annual Percentage Change in Employment in College-Manpower Intensive and Other Industries in Market Change

	1960-69	1969-74
1. Non-educational Industries that are College Manpower Intensive	3.8%	2.3%
a. professional services[a]	5.5%	5.9%
b. federal public administration	2.0%	0%
c. finance, insurance, realty	3.7%	3.2%
d. college-intensive manufacturing[b]	3.6%	-1.2%
2. Education	6.2%	3.9%
3. College Manpower Intensive (1+2)	4.4%	2.8%
4. Noncollege-intensive industries (all other)[c]	2.0%	2.0%
5. National Total	2.8%	2.2%

Source: U.S. Bureau of Labor Statistics, Employment and Earnings 1909-72- Bulletin 1312-9

a) excludes educational services

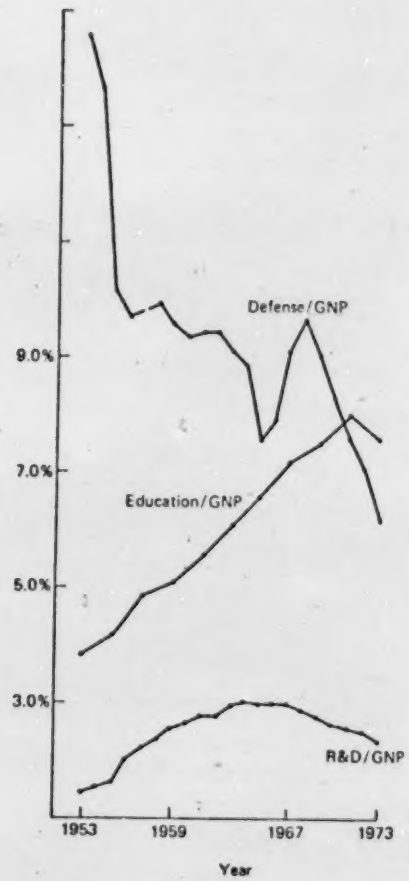
b) ordnance, chemicals, petroleum, professional instruments, aircraft, electrical machinery, and electronic computing machinery, with 1960 electronic computing machinery estimated.

c) agriculture included, based on data from U.S. Department of Commerce Survey of Current Business (various editions), with 1974 estimated.

The changing pattern of demand is examined from a different perspective in Figure 3, which displays the proportion of GNP allocated to three college-manpower-intensive activities--R&D, defense, and education. After increasing rapidly from the early 1950s through the Sputnik era, the proportion of GNP spent on R&D began to fall in the late 1960s. Actual R&D spending dropped significantly in deflated dollars in the early 1970s. Similarly, defense spending, which had fluctuated around 9-10% in the 1950s and 1960s, fell to just 6% of GNP in the 1970s. The proportion of GNP devoted to education also rose rapidly in the 1960s and then fell, from 8.0% to 7.6%, between 1971 and 1973, a drop magnitude to the fall in the R&D share of GNP.

On the supply side, there was a marked increase in the flow of new graduates into the market and in the ratio of college to high school workers in the 1970's, which contrasts sharply with the slower growth in the previous decade. At the bachelor's level, while the number of men obtaining BA's rose, the number on the job market increased only modestly in the 1960's, as a result of the greater propensity to go on to graduate and professional studies. Estimates by Cartter (1976) of the ratios of first-time male students in professional and graduate schools to bachelor's degrees show an increase in the proportion from 31% in the late 1950's to 41% in 1967 followed by a sharp drop to 33% in 1973 (Table 5.7, p. 87). On the basis of these figures, the number of male BA's entering the job market increased by 2.6% per annum in the 1959-67 period compared to 10% from 1967 to 1973. Relative to the male civilian labor force, the number on the market goes from .34% (1959) to .39% (1967) to .64% (1973). A similar pattern of relatively slow growth in the ratio of college to high school workers is found in Bureau of Labor Statistics estimates of the educational attainment of the work force.

Figure 3: Share of GNP Allocated to R&D, Education and Defense, 1953-1973



U.S. Office of Education, *Digest of Educational Statistics 1974*, Table 172, p. 152; Ibid., Table 27, p. 26; Data for 1955 and 1960–1973 from U.S. Department of Commerce, *Statistical Abstract of the United States 1974*, Table 488, p. 306. Data for all other years calculated from *Statistical Abstract of the United States 1962*, Table 327, p. 248, and U.S. Department of Labor, *Manpower Report of the President* (1974), Table G–3, p. 376.)

The BLS data show that, contrary to popular belief, there was essentially no increase in the number of college graduates relative to high school graduates in the 1960s and relatively little increase from as early as 1952, followed by an unprecedented jump in the 1970s. In 1957, for example, the ratio of the number of 18 to 24 year old college men (4 years or more) to high school graduates was .30; in 1970, it was .32; similarly the ratio of 25-34 year old college to high school graduates stood at .50 in 1962 and at .48 in 1970--indicative of essentially no change in the period. From 1970 to 1975, however, the two ratios shot up. The number of all college male workers relative to high school workers rose by 22% to .39%; the number of 25-34 year old college workers relative to high school workers increased by 42%, to .68! However measured, it is apparent that the supply of new graduates did not increase until the late sixties/early seventies, which postponed the problem of adjusting to the large enrolling classes of the 1960s until then.

The supply-demand explanation

The slowdown in the growth of demand for college graduates in the 1970s, following a decade or more of rapid growth, coupled with the large increase in supply, offers a plausible explanation of the observed downturn in the marketplace. Because the 1960s were a period of significant economic growth while the seventies were characterized by a major recession, however, cyclic factors, which are likely to affect demand for new graduates especially sharply, may also have contributed to the drop in the relative income and employment opportunities of graduates and have been suggested by some to

be the major force at work (American Association of State Colleges and Universities). To factor out the relative impact of shifts in supply, shifts in demand, and cyclic swings in the economy, I performed a two-stage analysis of the pattern of change in starting salaries, the relative income of 25-34 year old graduates, and the proportion obtaining professional jobs. First, I regressed the various measures of the economic position of college graduates on estimates of the shift in demand, the shift in supply, and the cyclic state of the economy. The size of the coefficients and the fit of the equations provide some indication of the impact of the proposed causal determinants and of the overall ability of the supply-demand explanation to account for the downturn.

Table 9 presents the basic regression results for the starting salaries and relative prices. In line 1 the ratio of the starting salary of male college graduates to the annual earnings of full-time workers is regressed on an index of the demand for graduates relative to total employment; a measure of supply, the ratio of male bachelor's graduates to the male work force; and a measure of the cyclic state of the economy, the deviation of the logarithm of real GNP from its trend level. In line 2 the income of 25-34 year old male college graduates relative to that of 25-34 year old male high school graduates is regressed on the relative number of college to high school workers in that age group, the demand for graduate relative to demand for high school graduates, and the cyclic variable.

The demand indices in the table are fixed coefficient measures of the effect of shifts in the industrial composition of employment on demand for workers with different levels of education. These indices are obtained by multiplying employment in each industry in each year (N_{jt}, for the jth industry in year t) by the proportion of workers in the industry with

the relevant schooling in a given base year (α_{ij}) for the ith education level and industry j, summing across all industries and deflating by the number in the base year to obtain an index. Fixed coefficient indices of this type are widely used in input-output analysis and in analysis of prices. They capture that part of the shift in demand for labor with different levels of education due to changes in the mix of industries, along the lines shown in table 9. While imperfect, the indices provide useful information about changes in demand (Freeman, 1977d). All of the variables in the regressions are in log units, so as to yield elasticities for parameters.

The principal result of the calculations is that the supply and demand terms affect the economic position of the college-trained in the expected manner, with supply reducing and demand increasing their relative incomes, though with quite different coefficient estimates in the two equations. The cyclic variable, however, is awarded a negative rather than a positive impact on relative incomes, implying that college graduates do relatively better in recessions than in booms, which makes it difficult to explain the downturn in the college market in terms of the weakened state of the economy in the 1970s. Overall, the regressions account for much, though by no means all, of the observed pattern of relative incomes in the periods covered. Additional analysis of the impact of supply, demand, and cyclic factors on the proportion of college men and women obtaining professional jobs tells a similar story: shifts in supply and demand rather than cyclic swings in the economy underly the observed downturn in the job market for college graduates (Freeman, 1977c).

The second stage in the analysis is to use the estimated coefficients on the shifts in supply and demand in table 9 to evaluate the relative importance of the two factors in the 1970s downturn. This is done by multiplying the coefficients by the observed shift in the demand or supply in the relevant period. Table 10 presents the resultant estimates.

Table 9: Regression Estimates of the Impact of Shifts in Supply and Demand on the Economic Position of College Graduates, 1947-1975

	Constant	Supply	Demand	CYCLE[a]	R^2
1. Ratio of College Starting Salary to Annual Income, 1947-73	-3.43	-.17[b] (.02)	.64 (.05)	-.29 (.14)	.92
2. Income of 25-34 year old college grads./25-34 year old high school grads. 1956-74[c]	0.11	-.52 (.18)	.27 (.22)	-.57 (.42)	.50

Source: Line 1, supply: male bachelors plus masters and doctorate degrees less the estimated first-year male graduate enrollments deflated by male civilian labor force
demand: fixed coefficient index for college graduates with 4 years of college using education by industry ratings from 1960 Census of Population, Industrial Characteristics and national income statistics from Survey of Current Business (July editions). See Freeman (1975).
Line 2, supply: Ratio of male college to high school graduates, with college men including those with 4+ years from U.S. Bureau of Census, Current Population Reports Series P-60, various editions with 1956 estimated from U.S. Bureau of Labor Statistics, Educational Attainment of Workers, demand: fixed coefficient index for men with 4 or more years of college using 1960 Census of Population education by industry weights and employment from national income statistics through 1973. 1973-1974 change estimated form 1973 industry by education matrix of B.S; Educational Attainment of Workers, March 1973, Special Labor Force report 161 and employment data in the Educational Attainment of Workers, March 1974, Special Labor Force Report 176

[a]CYCLE is the residual from the regression of log GNP on time.

[b]Supply lagged one period.

[c]Omitted 1957, 1959, 1960, 1962 due to lack of data.

[d]Note that the cycle term picks up cyclic patterns within industries while the demand index may pick up changes in the cyclic pattern of demand across industries.

Column 1 records the logarithmic change in the dependent variables in the 1960s, and in the 1970s; columns 2 and 3 give the change in the relevant demand or supply shift term, while columns 4 and 5 present the estimated contributions of the factors, obtained by multiplying the relevant regression coefficient by the shift in supply or demand. To focus attention on the turnaround between the 1960s and 1970s, the table also gives the difference between the periods for each factor.

While there are some differences in the effect of supply and demand on the two market indicators, the calculations tell a reasonably consistent story about their relative importance in the observed market turnaround, with the acceleration in the growth of supply rather than the deceleration in the growth of demand the prime cause of the drop in the relative income of graduates in the 1970s versus the 1960s. In the starting salary computations, the increased growth of supply in column 3 is much larger than the decreased growth of demand in column 2 (.40 versus -.07), so that even though the regressions accord a greater coefficient to changes in the demand index than to changes in the supply index, the estimated contribution of the change in supply to the market turnaround is twice as large as the estimated contribution of the change in demand. In line 2, which deals with the ratio of the income of 25-34 year old college to high school men, the results are even more striking. In this case the relatively small coefficient on the demand index in the regression of table 9 reduces the contribution of the deceleration of demand, so that supply changes virtually dominate the explanation. A roughly similar set of results are obtained when the measures of

Table 10 Decomposition of the Impact of Shifts in Supply and Demand on the College Job Market, 1960s Compared to 1970s

	Estimated Logarithmic Change			Estimated Contribution to Market Decline of Change in		
	Dependent Variable	Demand Index	Supply Index	Demand	Supply	Residual and Cycle
Ratio, college starting lary to annual income						
1960-69	.06	.10	.11[a]	.06	-.02	.02
1969-73	-.12	.03	.51[a]	.02	-.09	-.05
Difference	-.18	-.07	.40	-.04	-.07	-.07
Ratio, income of 25-34 ar old college to gh school graduates						
1958-1969	.00	.15	.04	.04	-.02	-.02
1969-74	-.14	.06	.28	.02	-.15	-.01
Difference	-.14	-.09	-.24	-.02	-.13	.01

rce: Data as in Table 9
Columns 4-5 estimated by multiplying columns 2 and 3 be regression coefficients given in Table 5.

[a]Lagged one year, 1959-1968 and 1968-1972, as in the regressions.

"employment opportunities" rather than relative incomes are taken as the dependent variable (Freeman, 1976e). While the analysis is too crude to yield more than order of magnitude estimates of the contribution of shifts in supply and demand, it does indicate that the prime cause of the market turnaround was the extraordinary spurt in the supply of graduates, with the deceleration in the growth of relative demand playing a more modest part in reducing the economic position of graduates.

The change in enrollments

What about the other major pattern of change in the depressed market of the 1970s, the levelling or decline in the proportion of young persons going on in their studies? Can this development also be explained, at least in part, by the supply-demand framework outlined previously?

Statistical computations relating the supply of young persons to college and to particular fields to economic incentives suggest an affirmative answer to this query. First, the sharp turnaround in the direction of change in the proportion of the young choosing college can be attributed largely, though not exclusively, to changing market incentives. Regression of the fraction of 18-19 year old young men enrolled in college on two basic measures of the economic incentive to enroll-- the income of graduates relative to other workers and relative demand for graduates, as measured by fixed weight index--accounts for 95% of the variation in enrollment from 1951 to 1974 and does a good job of tracking the '70s decline in the proportion of 18-19 year old civilian men enrolled (Freeman, 1975b). Bishop's analysis of the enrollment propensities of all young men and women, based on somewhat

different model specification, tells a similar story. He finds economic forces to have a major impact on the decisions of both men and women to enroll in college. Second, the various studies cited in table 8 show that much of the change in enrollments among fields--declines in physics, for example, compared to increases in engineering or among MBA's--are attributable to economic developments in those areas. Third, the continued flow of young blacks into higher education appears to be consistent with the maintenance of a sizeable return for black investments in college-training and to be closely linked to the growth of job opportunities in management (Freeman, 1977b, chapter 3).

While there is general agreement that economic forces influence the choice of fields of study once students are in college, there is some dispute about the relative importance of market conditions in altering the decision to enroll in the 1970s. Bishop has argued that, because of financial constraints in the capital market, tuition and related costs of education play a greater role in the decision to go to college than suggested in my analysis. Jencks has argued that changes in the draft law are a more important cause of the downturn in male enrollments in the 1970s than changes in the job market. While it is difficult to tease out of data the impact of developments which occur roughly coterminously in time, econometric computations do not show that large a draft law effect. Because the change in the draft law occurred at once, moreover, it is hard to explain the smooth drop in propensities to enroll shown in figure 2 solely in terms of such a development. Other sociologists have expressed the belief that models in which college enrollment depends on family background factors offer better explanations of the postwar experience that models which stress the economic decisions of students and their family. This approach cannot readily explain the drop in the proportion of men enrolled nor differences in patterns of change by sex or race.

What the future may bring and what we need to know

The most difficult and risky issue in analyzing the college job market relates to the potential period over which the economic status of graduates is likely to remain relatively depressed. Forecasting the economic future is replete with hazards and failures. Models that "fit" one period and seem valid often turn out--due to omitted factors or changes in structural relations--to be inapplicable in another period. Even with correct models, forecasts often err because exogenous factors--those aspects of the world not analyzed in the model--may differ from expectations, falsifying otherwise reasonable inferences about the future. The track record of economists in forecasting even a few months into the future is notoriously poor, as the failure to forsee the dimensions of the inflation and unemployment of the 1970s makes clear. Despite the dangers of forecasting and the dismal record of past forecast experiments, some predictions of the future are needed to guide decisions about the allocation of resources to higher education and to alert us to possible future social problems. What can be said about the future? Will the college market continue to worsen or will it improve in the next decade?

The analysis presented in tables 9 and 10, which attributes most of the sharp fall in the relative economic position of college workers to the rapid increase in supply in the early and mid 1970s, suggests an answer to the forecast question. Specifically, because the rate of increase in supply in expected to slacken in the 1980s, with the number of young graduates actually dropping due to demographic developments and to changes in the proportion enrolled, the analysis makes it unlikely that the economic status of graduates will decline further in ensuing years.

Formal forecasts of the ratio of the starting salaries of college graduates to the income of other workers, contained in The Overeducated American show, in fact, that barring unforeseen changes in demand, the relative economic position of starting workers with bachelor's degrees will stabilize at the depressed level of the mid 1970s until the end of the decade and then improve, especially in the latter part of the 1980s. The key element in these forecasts is the responsive supply behavior of young persons, whose decisions will help equilibrate the market by reducing the supply of new college-trained workers. If the proportion of the young electing higher education does not, for whatever reason, change in the expected manner, the depressed market for new entrants is likely to change much more gradually. The extent to which this projected improvement in the situation of new entrants will "spill over" to the graduating cohorts of the early and mid 1970s, however, is by no means clear, for it depends on the tasks performed by the various age groups and elasticities of substitution for workers will different years of experience, about which we have at present relatively little knowledge. Under certain assumptions, the situation will stabilize or improve in the late 1980s, when the total number of college-trained workers relative to the total labor force reaches an approximate equilibrium. The college share of the work force will increase until the latter part of the 1980s, despite cutbacks in the proportion enrolled, because of the the relatively small number of

retiring graduates, maintaining supply pressures until that period.

Very different future markets are, however, likely to characterize the different professions. Demographic factors suggest that the demand for elementary, secondary, and college teachers will be even weaker in the 1980s than in the 1970s, leading to especially poor markets in these professions. The sharp rise in engineering enrollments in the mid 1970s fortells a huge increase in graduates at the end of the decade, which will--all else the same--depress the market for engineers. The decline in the supply of new physical scientists and continued increase in the number of new biological scientists can be expected to produce a stronger market for the former and a weaker market for the latter in the 1980s than in the 1970s. The enormous variation in market conditions among fields in the 1960s, and in the depressed market of the 1970s will surely also be found in the next deacde.

Other forecasts appear less optimistic. Dresch has projected an even worse market in the 1980s than in the 1970s, though he focuses on 25 to 34 year olds, many of whom constitute the graduates of the seventies, rather than the graduates of the 1980s. The Bureau of Labor Statistics predicts that, relative salaries fixed, there will be a significant surplus of graduates in the 1975-85 period. All of these forecasts must be treated cautiously. Each has focused on only some portion of the results (for instance, wages and job opportunities in the case of my analysis) and neglected others. Previous attempts to peer into the future of higher education have been far off the mark. In 1949,

for example, Seymour Harris wrote a book predicting that the 1950s and 1960s would be decades of market glut: "A large proportion of the potential college students within the next 20 years are doomed to disappointment after graduating as the number of correlated openings (in professional jobs) will be substantially less than the numbers seeking them." Harris' expectations were falsified by the large increase in demand for graduates in the 1950s and 1960s, due, according to my analysis, to the shift in the composition of industrial employment, the spurt in R&D spending, and demographic changes that led to the expansion of the education sector. Prior to the market turnaround in the 1970s, human capital economists were concerned with reasons for the stability in the ratios of the incomes of educated to less-educated workers (Griliches, 1970) and sought relatively long-term or permanent rather than temporary reasons for the pattern. Possible factors that have not been covered in this essay (technical change? substitutions due to energy and related raw materials cost increases? demand for education as a consumer good? governmental responses to the depressed market?) may invalidate the analysis.

More fundamentally, much additional knowledge about supply, demand, and the functioning of the college job market is needed to help evaluate on-going developments and predict the future. One of the most important areas of ignorance relates to the relation between the demand for young graduates and for older graduates. To the extent that substitution between new entrants and the stock of experienced workers is large, the impact of changes in the relative number of new graduates on the market will diffuse to all college workers, with the result that graduating with a large or small college class will have only modest effect on economic

status. If substitution is sizeable, the projected upturn in the market for new bachelor's workers in the 1980s will be lessened, due to competition for jobs between the small classes then and the large graduating cohorts of the seventies. Alternatively, to the extent that substitution by age groups is slight, the effect of large increases (decreases) in the number of new graduates will be limited primarily to the particular goup. Significant 'cohort effects' are likely to persist for some time, with persons graduating with large classes suffering from "oversupply" and those graduating with smaller classes benefitting from "undersupply" throughout a good part of their careers.

A second major gap in our knowledge base relates to the demand for college workers. While studies of the Bureau of Labor Statistics and others provide some information on the effect of interindustry component of demand for graduates, we lack adequate data and analysis of the many factors that determine the level of demand schedules, particularly technological change; about skill substitution possibilities; and about demand behavior at the enterprise level. The hypothesis that educated workers are relatively complementary in production with certain types of new capital (Griliches) or with the rate of technological advance (Schultz, Welch), which suggests a link between relative demand for college workers and productivity advance, investment in new technology and research and development activities, deserves some analysis.

With respect to the operation of the job market, the "active market" hypothesis, which has guided much work, needs more analysis and testing. According to this hypothesis, adjustments to disequilibrium occur largely at the new hires entry job level and impinge mostly on the young so that, as argued earlier, the economic position of new

graduates becomes the best measure of changes in the supply-demand balance. While the hypothesis has considerable a priori plausibility, we lack at present rigorous models of firm behavior which embody it; detailed empirical studies which delineate differences in the adjustment of persons in the 'active' market from those in the internal market; and specific institutional knowledge of the way in which firms choose between seeking new graduates, more experienced personnel, or internal staffing to meet changes in manpower needs.

On the supply side, much more knowledge is needed about information flows and the way in which increases in the information available to students and other decision makers would influence supply and related behavior. Much more knowledge is also needed about the career patterns of persons who decide against going to college and about the alternatives considered by those selecting certain types of fields. The extent to which one scientific specialty draws young persons from other science fields, as opposed to law or medicine, for example, deserves study. Perhaps most importantly, much less is known about the role of economic forces in female than male decisions regarding careers and schooling.

In short, there are enough gaps in our base of knowledge to make analysis of market developments prone to considerable uncertainty. And forecasts of the future prone to much more.

Policy Issues and Implications

Governments are a major source of support for higher education. State funded colleges and universities enroll three-fourths of the college students in the United States. Federal aid to higher education through stipends, loans, and grants and through support of research and development at major universities is substantial. In years past, governmental funding of higher education has had both successes and failures. The number of colleges and universities has been increased enormously, as has the number of students enrolling in various programs. Access to college training has been greatly expanded, particularly for minorities. On the other, instead of stabilizing the supply and demand situation, governmental activities have induced sizeable swings from shortage to surplus in the job market, with consequent waste of human resources. This has been most pronounced at the graduate level where in the 1960s federal R&D and fellowship policies encouraged enrollment in PH.D. and masters programs but in the 1970s, when the enrollees graduated, spending policies operated to reduce demand, with the resultant sharp slump in the market. Similarly, at the undergraduate level little thought was given to the potential consequences of large increases in the number of graduates on the market nor to the effect of demographic changes in demand for teachers, the major occupation of education and liberal arts majors. In general, governmental policies have concentrated more on expanding the scale of education than on improving the quality of schooling or on reducing swings in the marketplace. While the particular policies which should have been pursued are debatable, it cannot be denied that governments took a myopic short-run view of what are inherently long-run resources and exacerbated rather than ameliorated market problems.

The observed turnaround in the college marketplace has given rise to controversy and concern regarding public policy toward higher education. The American Association of State Colleges and Universities has expressed the fear that evidence about the decline in the economic rewards to college will "play into the hands of some state officials, anxious to cut spending for budgetary or political reasons." Some educators have attacked the notion that any attention should be given to the pecuniary rewards of higher education. Others have tried to deny the facts. In a thoughtful piece, Jencks worried over the possibility that programs designed to increase the opportunities to attend college by persons from poorer backgrounds would be cut back, with undesirable consequences for social mobility.[23] What are the lessons of the developments examined in this essay and in The Overeducated American for policy toward higher education?

Before examining this question, it is important to remember what has and has not been shown in the research. We have found that the job market for college-trained workers underwent a downturn in the 1970s which reduced but did not eliminate the economic rewards of college to new graduates. Starting college workers continued to earn more and obtain better jobs than nongraduates, though with a smaller advantage over other workers than in years past. Moreover, different fields and groups were affected differently by developments in the period: in some specialties the job market remained good; in academic and research oriented disciplines, conditions became especially difficult for new entrants; the returns to

investments in college by blacks remained high, largely as a result of relatively poor opportunities facing young blacks with high school degrees.

While the downturn in the 1970s marks a sharp break from the booming market of previous decades, the significance of the change should not be exaggerated in policy evaluation. First, at least some forecasts of the future suggest, albeit speculatively and with considerable uncertainty, that the market for new bachelor's graduates may improve substantially in the 1980s. Most, if not all, of the drop in the relative economic position of new graduates may have already occurred, making a continued worsening in the market unlikely. To the extent that the 1980s appear likely to differ from the 1970s, policies affecting that decade should not be based on extrapolation of seventies developments.

Second, while important, the job market payoffs of college training are by no means the whole story. Students attend and society subsidizes higher education for diverse nonmonetary reasons: to transmit cultural values; to produce certain types of attitudes; to mix people from different backgrounds, and so on. These benefits are real and valuable and represent a presumably unchanging component of the value of higher education. They should not be overlooked in evaluating the meaning of changes in the job benefits. Educators are, of course, unlikely to let anyone forget them.

Given the preceding view of the changing market for college graduates, let us consider the possible lessons or implications of the economic changes given herein for policy issues.

One important lesson from past developments and knowledge of the way

in which the college marketplace operates is the need to avoid volatile shifts in policies toward higher education and related activities such as research and development. Educated manpower is a long run resource and policy affecting it ought to be based on long run rather than shortrun crisis oriented considerations. Volatile changes in policy distort the education-manpower system and create deleterious swings in the market which harm individuals and society. From this perspective, it is important that policy makers do not overreact to the market of the 1970s and replace the "expand, expand" principle of the decision-making of the previous decade with an equally extreme "cut cut" principle. Instead, an effort should be made to move smoothly to what may be called a "new steady state" in higher education, with the scale of graduate and undergraduate training more aligned with demographic and economic reality than in recent years. In some cases, this may involve maintaining certain programs with high entry costs that are not currently in great demand in order to preserve continuity in development and the option of expansion in the future. In other cases, it may involve reduction of support of training in areas which may overexpand due to a relatively strong market in the 1970s, for instance in biomedical sciences.[24] In all cases, it should involve gradual rather than sudden swepping changes.

Several other possible areas of policy action deserve some attention. If, as forecasted, the market in the 1980s improves, there may be need for particular programs to help retrain the graduates of the seventies,

who may be able to advance in the market at that time. Consideration should be given to the return to investments in the "quality" rather than quantity of higher education, about which relatively little is known (see Solmon, Taubman & Wales), particularly in light of declines in SAT scores. Possible ways of improving the interrelation between college training and the job market, ranging from requiring colleges to provide students with information on the placement of recent graduates (as may be required of proprietary technical schools and business institutes) to encouraging work-study programs should be investigated. In a booming market, such activities may be of marginal importance; in a troubled market, they may be highly valuable.

Another set of options which have been suggested relative to the demand for graduates. The government could try to stimulate demand for college graduates facing especially tough markets through initiation of special programs. In Canada, in 1976 companies were paid upwards of $11,000, for example, to hire Ph.D.'s, with the hope that they would find these specialists sufficiently valuable to maintain their employment in the future.[25] One reaction to the surplus of teachers might be to go in seriously for early childhood education or for a major effort to upgrade the quality of schooling in inner cities. While the availability and reduced relative cost of graduate manpower should, of course, be considered in evaluating such programs, the fact that graduates continue to do better than the less educated argues, however, against special aid to the educated. Special demand-stimulation programs should focus on the disadvantaged, not on college workers whose advantage over others has diminished. Finally, nothing in the economic analysis forecloses the

possibly that, as some educators argue, we could decide to ignore changes in market conditions and opt for a society that is overeducated in the job market but not in relation to human potential. On the basis of the behavior of individuals in the market, however, such a development seems highly unrealistic. Just as the noneconomic aspects of college cannot be disregarded in decision-making, neither can the economic factors.

Footnotes

[1]Including the National Institute of Health, National Academy of Sciences, Office of Technology Assessment of the Congress.

[2]See the bibliography of this report for these studies.

[3]These data are taken from National Science Foundation, Two Years After the College Degree (1963) and U.S. Bureau of Labor Statistics Employment of Recent College Graduates (OCD, 1972), Special Labor Force Report No. 169. The two surveys report the status of graduates at different times in their work history. The 1958 data relate to 2 years after the degree; the 1972 data to 6 months afterward. This is unlikely to bias the results substantially, as 6 months is a reasonable time to find the type of job graduates have normally held. For a more detailed comparison, see Freeman (1976), pp. 18-20.

[4]Total and professional unemployment U.S. Department of Labor Employment and Training Report of the President 1976, Table A-16, p. 236. Young men from U.S. Bureau of Labor Statistics, Special Labor Force Reports 191, p. A-17 and No 186, p. A-11.

[5]The data in this section come from U.S. Bureau of the Census, "School Enrollment," Current Population Reports, Series P-20: No. 278, Tables 4, 5; No. 206, Table 1 and No. 260, Table 19. Figures for older persons are also given in U.S. Bureau of Labor Statistics, Going Back to School at 35,

Special Labor Force Report, No. 159, and in The New York Times, (20 April 1975), p. 9.

[6]Data on Ph.D.'s are taken from National Academy of Sciences Summary Report Doctorate Recipients from U.S. Universities, Table A, p. 4. Figures for law school are reported in The Overeducated American, p. 128. The data for MBA's are from U.S. Department of Health, Education, and Welfare, National Center for Education Statistics, Projections of Educational Statistics to 1984-85, table 22, p. 45. Accounting is in cluded with other business and management in my calculations.

[7]The data in this section are taken from U.S. Bureau of the Census, Current Population Reports, Series P-60, No. 101, table 58, p. 123 and No. 75, table 47, p. 108. The calculations relate to medians.

[8]U.S. Bureau of the Census, Current Population Reports, Series P-60, No. 75, table 47, p. 104 and No. 101, table 58, p. 118.

[9]See Freeman (1976a), chapter 6, p. 144.

[10]Data for 1970 from U.S. Bureau of the Census, Census of Population, 1970 Occupational Characteristics, table 2, p. 12 for 1975 from U.S. Bureau of Labor Statistics, Employment and Earnings (Jan. 1976) Vol. 22, No. 7, table 2, p.11. Data for male graduates from U.S. Bureau of Labor Statistics, Special Labor Force Reports No. 125, Table 5, p. A-29; and No. 186, Table 5, P. A-21.

[11]Among the studies relating to black faculty pay are Gordon, Morton & Braden; Freeman; Hoffman. The NSF data are reported in Characteristics of Doctoral Scientists and Engineers in the U.S., Detailed Statistical tables, Appendix B, table B-10, p. 141.

[12] In particular, the drop in black and other minority enrollments in medical school from 1974 to 1976 elected some concern. In 1974 minority students constituted 10% of admittees; in 1976, 9%. See Wall Street Journal 21 Dec. 1976, p. 14.

[13] Income data are from U.S. Bureau of the Census, Current Population Reports Series P-60, No. 75, Table 47, p. 105 and No. 101, Table 58, p. 120. The placement survey figures are from F. Endicott, Trends in Employment of College and University Graduates in Business and Industry (Evanston, Illinois, Northwestern University , 1969, pp. 4-5, and 1975, p. 4,6)

[14] U.S. Bureau of Labor Statistics, Special Labor Force Reports 125, p. A-28, 186, p. A-20. The data relate to women with 4 and more than 4 years of college.

[15] See Freeman (1976), chapter 7, table 15, p. 174.

[16] op. cit., pp. 177, 179.

[17] See National Education Association, Teacher Supply and Demand in Public Schools, 1973 (Washington, D.C., NEA). The AAUP data are from The Economic Status of the Profession, Summer edition of AAUP Bulletin.

[18] The degree figures are from U.S. Department of Health, Education, and Welfare, Projections of Education Statistics to 1984-5, table 23, p. 47. the career plans data are given in Freeman (1976), table 3, p. 40.

[19] The land grant data are from New York Times, 17 January 1975. The MBA data from Scientific Manpower Commission, Manpower Comments Vol. 12, No. 5, June 1975, p. 5. The life science data are from

[20]American Council of Education, The American Freshman: National Norms for Fall 1971, American Council on Education Research Reports, Vol. 6, No. 6, 1971, pp. 27-28.

[21]Evidence for the relation between nonprice measures of market conditions and career choice is given in Freeman 1971, 1975a, 1975c.

[22]S. Dresch, "Demography, Technology, and Higher Education: Toward a Formal Model of Educational Adaptation," Journal of Political Economy (March-April 1975).

[23]For the AASC position, see The Value of a College Education (Washington Oct. 1976). The notion that there is no problem is given by Witner in "Is the Value of College Going Really Declining"? Change, Dec. 1976. Jencks' work is contained in Working Papers for a New Society, Summer 1976, pp. 6-11. This is not to suggest the desirability of such a policy but rather the need to think about it.

[24]See R. Freeman, "Employment Opportunities in The Doctorate Manpower Market: Biosciences and Psychology," report to the National Academy of Sciences, 1975e.

[25]Business Week, Dec. 6, 1976, p. 88.

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